

DEC 20 1929

THE IRON AGE

Seventy-fifth Year

DECEMBER 19, 1929



Greetings

from

American Steel & Wire Company

Again the Yuletide, with its inspirations of good cheer is with us—the New Year approaches—and we sincerely extend to you our best wishes for a very Merry Christmas and a Happy, Prosperous Nineteen Thirty

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Let's Forget Business

Late December, and again the holidays put forth a restraining hand to check the rush of a busy world. In a few days we will forget business for a while—but not the thousands of friends with whom we have worked and those who have

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Contents for December 19, 1929

Thorough Studies Lower Shop Costs . . . 1647	Production Control and Materials Handling . . . 1654
Bonus, Premium or Other Wage Incentive Not Always the Only Cure	
Making Aluminum Aircraft Castings . . . 1650	Education and Training for Industry . . . 1662
Careful Heat Treatment and Temperature Control in Melting Are Features	
Strength of Zinc-Base Die Castings . . . 1655	Engineers' Place in American Life . . . 1703
Discussion of Gravity and Pressure Methods and Types and Merits of Alloys	* * *
High Speed in Cupola Melting . . . 1659	Book Reviews . . . 1668
Many Metallurgical Advantages, and Most Foundry Cupolas Are Slow	
River Shipments Gaining Rapidly . . . 1660	New Equipment . . . 1670
Ten-Year Increase of 339 Per Cent in Ohio River Tonnages of Iron and Steel	
Shallow Cuts at High Speeds . . . 1663	This Week's IRON AGE in Brief . . . 1677
Experiments in Turning Metals Include Effects of Heat Treatment on Tool Performance	
Mechanical-Spring Characteristics . . . 1664	EDITORIALS . . . 1678
Radially Tapered Disk Springs and Elastic Behavior of Spring Materials Considered	
Iron Mining Revival in Normandy . . . 1667	The Week in Business . . . 1681
Region Develops Into One of Largest Iron- Ore Reserves, with Low Costs	
Is Business Like 11 Years Ago? . . . 1673	Iron and Steel Markets . . . 1682
Output of Basic Materials Off More Than Retail Trade, Then as Now	
	Non-ferrous Metal Markets . . . 1699
	Personal Notes . . . 1701
	Foreign Steel Markets . . . 1707
	Machinery Markets . . . 1710
	New Trade Publications . . . 1715
	The Week's News Quickly Told . . . 1716

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THE HARTOMETER

MODEL "K"



A screw thread gage for use of the operator at the machine. If a screw passes this gage it will enter the nut or tapped hole. Furthermore, it will be a strong dependable screw, because the lead and pitch diameter will be correct. ♦ ♦ ♦ ♦ ♦



JONES AND LAMSON MACHINE CO.
SPRINGFIELD, VERMONT

THE IRON AGE

New York, December 19, 1929

ESTABLISHED 1855

VOL. 124, No. 25

Thorough Studies Lower Shop Costs

Review of All Problems Incidental to Production Costs
Necessary—Bonus, Premium or Other Wage
Incentive Not Always the Only Cure

BY CRIS BERG*

IN many instances efforts made to reduce costs are not in themselves sufficiently broad and complete to attain results which are possible. Further, it often happens that an accomplishment of a reduction in cost is taken as a finality, without regard to a thorough coordination of men, methods and machines through which further lowering of cost may be possible. It is manifestly unfair to the equipment manufacturer if the whole burden of cost reduction is placed on his machine, when at the same time the flow of material, instructions to employees and other unfavorable conditions virtually strangle the machine, and keep it from doing work in the manner and in the quantity for which it was designed.

Wage incentive schemes or plans, whether piece work or bonus, cannot be considered as cure-alls for all of the evils of high cost of production. First of all it is necessary that the wage incentive be applied on the basis of studies which should follow the correction of miscellaneous factors, all of which will have an important bearing on whether or not the net outcome of the wage incentive plan will be successful.

How One Concern Attacked the Problem

Three tables herewith show data prepared from three departments in one manufacturing concern. It will be noted that, in the cases of the foundry and the machine shop, comparisons are drawn between wage incentive plans and day work. In the case of the structural shop the comparison is between a new premium system and an old premium plan. In each case the new plan, figures for which are given in the right-hand columns of the tables, on the following pages, was put into use only after

DEFINITE benefits accruing from rational application of a bonus or premium system of paying for work done are outlined in this article. Specific analyses for three separate departments show similar, but unequal, gains in daily output. But these are not haphazard results; they accrue as the reward of a thoroughgoing study of the problem for each individual operation and for the shop as a whole.

studies of the entire shop problem.

The old-style premium system in the structural shop had been put into use without study of surrounding conditions. Consequently the average saving resulting from the new plan was higher in the case of the structural shop than in either the machine shop or the foundry, where day work had continued in practice. This demonstrates the need for a complete study of shop conditions, and also shows the fruitlessness of applying wage incentives without first rectifying as many as possible of the bad practices which tend to offset the advantages of a wage incentive scheme.

Thorough Study Is Essential

Thus the problem resolves into one of adequate and thorough study of all conditions which have a bearing on manufacturing cost. It often extends beyond the shop doors to the stockroom, and even to the clerical force in the office. Any accomplishment in the way of cost reduction should be taken as an incentive to search further under the assumption that work of this character is never finished.

There remains only to find the way which leads to still lower manufacturing cost. Sometimes this is accomplished by the purchase of new equipment; often by speeding old machines; by the rearrangement of manufacturing units; wage incentives; handling of orders and materials, and by a proper method of routing. Always, however, the best results are obtained when all the above factors are developed as far as possible, and so synchronized that one is an aid to the other.

Finding the "Neck of the Bottle"

FROM a plant where new equipment recently was installed, with the expectation that no further effort would be necessary to increase production and to cut cost,

*Consulting engineer, Chicago.

Table I.—Gray Iron Foundry Work

Kind of Piece	Weight of Casting per Piece	Day Work		Piece Work		Increase in Production, Per Cent
		No. of Pieces	Time in Hours per Piece	No. of Pieces	Time in Hours per Piece	
Stands	20 lb.	15	0.70	15	0.50	40
53-in. gear	500 lb.	1	6.00	1	4.00	50
56-in. gear	900 lb.	1	9.00	1	4.50	100
End castings	30 lb.	15	0.40	15	0.24	66
Worms	40 lb.	6	0.33	10	0.20	65
Plunger	330 lb.	2	3.50	2	2.20	59
Drum	350 lb.	12	4.00	12	2.00	100
Frame	100 lb.	6	1.70	10	1.00	70
Core work—rollers	18 lb.	200	0.18	200	0.11	64
Core work—clutch	238 lb.	2	1.00	2	0.50	100
*Total and average			136.68		78.20	75

*Based on number of pieces in day-work column.

the following illustration is taken. The burden was placed wholly on the new equipment. Neither effect was realized except in a small way, because the flow of material formed the neck through which, without readjustment, greater production was impossible.

A new drying oven was installed, with many distinctive improvements over the old ovens. Ahead of the oven were two chain conveyors, the first one feeding to the second, which carried the product through the oven. After trial operation of many weeks, the only benefit derived was that of lower fuel cost. The oven could not be worked at capacity, simply because the conveyor was not loaded heavily enough. The conveyor could not be fully loaded because raw material did not move from the storeroom to the manufacturing department in properly proportioned lots. The stores department was to blame only in part, because the order department took no recognition of the problems involved in the actual manufacture of the product.

It was the practice of the order department to tabulate incoming orders until an (arbitrarily assumed) sufficient number of pieces of each kind had accumulated so that an order should be given to the shop. When this stage had been reached an order was issued on the factory, by way of the material storeroom. There the storekeeper, without a knowledge of shop conditions, used hit-and-miss judgment in sending material to the shop. He often separated items on an order, sending first to the shop that material which was easiest for him to handle or to take from stock.

The results were two-fold. Work went through the shop in slugs, and parts of an order often remained in the storeroom for a month, delaying shipment of the complete order far beyond even the unnecessarily long time required to get the first part of the order through

the shop. This unsystematic method of handling orders and materials, which resulted in the unbalanced loading of the conveyors, so hampered this plant that it was able to ship finished products on only about one-half of the working days in each week.

Correcting Bad Conditions

The remedy was simple. The expenditure for the new oven having already been made, the only further outlay necessary was a few hundred dollars whereby the two conveyors were mechanically adjusted to cover all necessary conditions of loading. There was established also a scheduling department which was responsible for loading of the conveyor so that a properly correlated assortment of parts passed through the oven each day. This solved the problem in the shipping room, from which finished materials started to move every day.

Purchase orders are now forwarded without delay to this scheduling department. There an analysis is made and material is ordered out of stores in such quantity and in such sequence that the conveyor will neither be clogged nor only partly loaded. The schedule is such that finished parts will reach the shipping department in such quantity and assortment that orders may be promptly filled and promises of delivery kept.

As a result of the new management methods, the oven exceeds the rating given it by its manufacturer. Above all, the output of the shop was more than doubled, with only a small increase in labor needed to load and unload the conveyors.

Three Departments Show Large Gains

CONDITIONS similar to the above are not confined to any one phase of manufacturing. Recently a 76 per cent increase in production was made possible in the jobbing foundry referred to in an early paragraph simply by rearrangement of working space and equipment and installation of a wage incentive. Before changes were made the men were paid by the day. Molding machines were available, but they were poorly located with respect to the shop as a whole. Molders, after having finished a job, left the floor in search of a new one and the pattern necessary for it.

One of the first steps taken to revamp methods in this foundry was to study the flask situation. The assortment was, generally speaking, satisfactory for the run of work at hand. However, the storage space was unhandy with respect to the molding floor and flasks were piled with no regard to type or size. Hence much expense was incurred in sending them to storage, digging out the flask needed and again returning it to the shop. A handy storage space and orderly stacking overcame this difficulty.

Table II.—Machine Shop Work

Kind of Piece	Day Work			Piece Work or Premium Work			Per Cent Increase in Production
	No. of Pieces	Machine Used	Time in Hours per Piece	No. of Pieces	Machine Used	Time in Hours per Piece	
43-in. cast steel gear with clutch ring	4	Vert. boring mill	12.00	1	Vert. boring mill	5.20	Piece work 130
30-in. cast iron brake wheel	2	Vert. boring mill	6.30	1	Vert. boring mill	3.50	Piece work 80
37-in. cast steel cut gear	2	Vert. boring mill	7.20	1	Vert. boring mill	2.50	Piece work 188
Cast steel frame	2	Planer	15.00	1	Planer	8.70	Piece work 73
Cast steel frame	2	Horiz. boring mill	28.80	1	Vert. boring mill	5.00	Piece work 203
Cast steel rollers	102	Vert. boring mill	0.78	102	Vert. boring mill	0.43	Premium 81
40-in. packing metal rings	25	Planer	1.92	34	Planer	0.48	Premium 300
40-in. packing metal rings	6	Lathe	3.40	6	Lathe	1.14	Premium 200
Cast iron frame	2	Babbitt floor	11.10	2	Babbitt floor	6.50	Premium 72
Cast iron frame	2	Assembly	24.30	2	Assembly	16.20	Premium 50
*Total and average			381.36			177.30	115

*Based on number of pieces in day-work column.

Foremen were instructed to watch the progress of jobs and anticipate their completion, and to have delivered promptly to the molder the pattern which the schedule called for next. The layout of the floor was planned so that products now move progressively down aisles of ample width. This relieves congestion at the molding machines, making it possible for them to produce at rated capacity.

Piece work was based on a thorough motion study. The results were that output was increased over 75 per cent; not an extra man was employed; no expenditure was necessary for new equipment; the cost of production was lowered and the men were allowed to earn about 33 per cent more a day than with the old day rate.

Table I shows the increase in production brought about by the new methods. Figures are given for a number of miscellaneous items, some of which were made in single pieces, while others went through the shop in lots up to 15 pieces in each. The time required to make a single 56-in. gear was cut in half. The saving in time of making cores showed 64 per cent and 100 per cent increase in hourly output for the two jobs was accomplished.

How the Machine Shop Was Benefited

In Table II are shown results obtained after putting into practice improved methods in the machine shop. No new equipment was purchased, as most of the machine tools on hand were of recent design. Machine speeds were adjusted; cutting tools were properly ground; machine tools were rearranged with reference to the sequence of operations to be performed.

Special attention was given to the methods and time for setting up jobs in the machines. A material routing system was put in operation and both the men at the machines and the foremen were given advance information, so that they could plan a set-up ahead of time and have tools and material ready to start the new job. Time studies were made and piece work and a premium system of payment supplanted the old day rate.

Production in the shop was increased on the average, 104 per cent. The use of piece work resulted in a gain of 135 per cent, and on those jobs where the premium system was used the gain was 70 per cent.

Gains in Structural Fabricating Shop

Basis for establishment of a premium system may be at fault, and that, combined with other unfavorable factors, may choke shop production. The structural fabricating shop had for some time made use of a premium system which had been roughly based on records of day-work cost. It had been expected that the magic word premium would bring low cost. Little effort was directed in that early attempt at conditions under which the work was performed.

Some time was spent in the recent change in rearranging machinery. Aisles were cleared and material to be worked was carefully classified and piled in an orderly manner, convenient to the various machines. Then time studies were made and a new premium system was built from them. The workmen were instructed now to make the best possible use of the equipment.

Results attained are shown in Table III. The average increase in production was 106 per cent. It is noted that the production increase in several cutting operations ranged from 1 per cent to 300 per cent. This divergence in itself was clear proof that hit-and-miss production methods had been in use and that improvement was overdue.

When studies were completed, instructions were written covering each operation. This was done so that workmen and foremen could duplicate conditions for a specific

job even though it might not get into production again except at long intervals.

Standard Speeds and Feeds Important

Often there is lack of interest in applying standard speeds and feeds in machine shops which are run on day work. It has been shown time and time again that the use of these standards is habit-forming among workmen and these habits become especially valuable in shops where day work and piece work are mixed. Once the men become accustomed to operating a given size drill at its proper speed they will of habit maintain these standards on any work which passes through their hands. It is therefore to be urged that standard speeds and feeds be specified for all classes of work throughout the shop.

A point often overlooked is the checking of patterns, to ascertain whether or not the castings will carry extra metal which later must be removed at unnecessary expense.

With reference to the attitude of the workmen, it should be impressed upon them that the possibility of earning higher wages depends on maintaining new conditions and on following instructions. No method is long satisfactory which is not closely adhered to. Finally, regardless of whether new or old equipment is used, one must coordinate all factors which contribute to the problem of production. Then the workman can be at his best.

Table III.—Structural Shop Work

Kind of Piece	Operation	No. of Pieces	Old Style Premium Work ; No Improvement in Condition	New Premium Work after Condition Had Been Improved		Per Cent Increase in Production
			Time in Hours per Piece	No. of Pieces	Time in Hours per Piece	
Special Container Size A— $\frac{1}{2}$ -in. Steel						
Special Container	Cut	106	0.194	50	0.160	21
	Punch	106	0.349	50	0.128	173
	Drill	106	0.140	50	0.070	100
	Form	106	0.185	50	0.112	65
	Assemble and rivet	106	0.565	50	0.284	98
Special Container Size B—No. 8 Steel						
Special Container	Cut	108	0.157	58	0.155	1
	Punch	108	0.155	58	0.098	58
	Drill	108	0.034	58	0.034	0
	Assemble and rivet	108	0.290	58	0.128	127
Special Container Size C—No. 10 Steel						
Special Container	Cut	139	0.223	118	0.107	108
	Punch	139	0.060	118	0.060	0
	Drill	139	0.062	118	0.054	15
	Form	139	0.110	118	0.042	163
Special Container Size D—No. 10 Steel						
Special Container	Cut	64	0.320	137	0.080	300
Special Container Size E—No. 10 Steel						
Special Container	Cut	46	0.410	88	0.123	233
	Punch	46	0.250	88	0.064	290
	Form	46	0.292	88	0.039	645
	Assemble and rivet	46	0.220	88	0.102	116
Special Container Size F— $\frac{1}{2}$ -in. Steel						
Special Container	Cut	96	0.250	96	0.210	19
	Punch	96	0.345	96	0.164	110
	Notch	96	0.193	96	0.053	264
	Form	96	0.920	96	0.535	72
	Assemble and rivet	96	2.040	96	0.950	115
8-in. long pieces of flat bars						
	Punch	50,000	0.00372	50,000	0.00340	9
*Total and average			905		535	69
*Based on number of pieces in day-work column.						

*Based on number of pieces in day-work column.

Making Aluminum Aircraft Castings

Careful Heat Treatment Needed—Temperature Control of Melting a Feature—Wood and Metal Pattern Shops

BY FAY LEONE FAUROT*

TWENTY Bellevue oil-fired furnaces are employed in melting metal for castings in the foundry of the Wright Aeronautical Corporation, Paterson, N. J. All the melting furnaces are located in one room in the center section of the main floor. The casting floors, equipped with roller conveyor tables made by Eastern Steel Castings, Newark, N. J., have been installed at convenient points in front of the entrance of the furnace room. Aluminum "Y" metal is used for cylinder heads and pistons, the pouring temperature of the "Y" metal being about 1300 deg. Fahr. For the crankcase castings the Aluminum Co. No. 195 metal is specified.

A pyrometer room equipped with Wilson-Maeulen Co. apparatus makes it possible for the temperature of each furnace to be read at any time. Here the observer may signal, by means of three electric lights mounted at a convenient point on the ceiling, when the metal is ready for pouring. A green light indicates that the furnace is coming up to heat; a red, that the temperature is excessive; and a white, when the critical pouring temperature is reached. In addition, the temperature of the metal

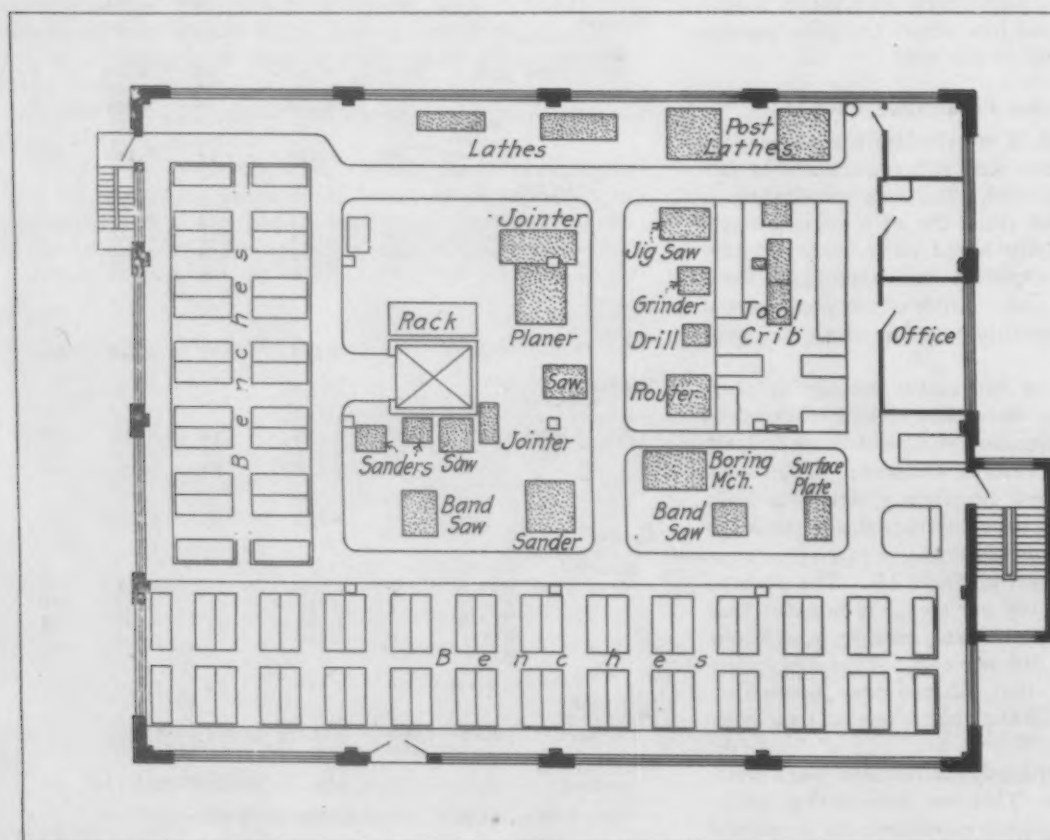
in the ladle of each heat is ascertained by a pyrometer inserted just as the metal leaves the furnace room. Later each casting is stamped with the number of the heat, and thus a complete check on each heat is obtained.

After the castings have been shaken out they are taken to the cleaning room, where the gates and risers are sawed off by power-operated band-saws. Later they are chipped by pneumatic hammers, snagged, pickled, sand-blasted, stamped and given a careful inspection. The piston castings are rough turned outside before being heat treated, so that there may be uniform heat penetration.

Annealing and Aging the Castings

After the castings are made, it is necessary to reheat them to remove the casting strains and also to age the castings, to improve their tensile strength. This process is accomplished in an electrical truck loading oven, with outside dimensions 9 ft. wide, 9 ft. deep and 7 ft. high. It handles two cars 3 ft. wide by 6 ft. 9 in. long, each heat. The oven is electrically heated with a connected load of 60 kw., provided with automatic temperature control, and the range in operating temperature is from 200 deg. to 700 deg. Fahr., depending on the particular process under way. The circulating system with which

*Mechanical engineer, New York. The design and equipment of the Wright aeronautical foundry, together with an account of the making of engine castings, cores and the like, were covered in an article in THE IRON AGE, Dec. 12, page 1587.



WOOD Pattern Shop Layout in Wright Aeronautical Foundry. This is on the third floor of the building and, as the diagram shows, has excellent day lighting all around. Automatic sprinklers protect pattern shops and storage from fire danger

this oven is equipped provides most uniform heat distribution.

All of the crankcase parts, the pistons and cylinder heads are heat treated or annealed in electric furnaces at 960 deg. Fahr. The cylinder heads and pistons are aged at 400 deg. Fahr., and the crankcase sections at 212 deg. Fahr., in Gehnrich indirect-heat ovens.

All three parts are then pickled by immersing in hot caustic soda, followed by a nitric acid solution. The floor of the pickle room is protected by a pavement of acid-proof brick and the walls are coated with paraffin. After a final washing, the parts are taken to the inspection room and carefully explored for checks, cracks and other defects.

Some castings which are imperfect show up blowholes. After the preliminary grinding these are pre-heated in (three) welding furnaces or ovens to a temperature of 900 deg. Fahr. and the blowholes then filled up by welding in on the hot castings. The ovens are of the car type, each oven having outside dimensions 6 ft. 8 in. wide, 7 ft. 4 in. long, 7 ft. high, and handling a car 36 in. wide by 72 in. long. Ovens are oil heated and operate at 800 to 900 deg. Fahr. The oil system operates from 16 oz. air pressure and 25 lb. oil pressure. There are a number of stands for oxygen-acetylene blowtorch welding.

To shrink the finished cylinder-head fin body on to the steel cylinder, the heads have to be expanded by heating to a temperature of 750 deg. Fahr. This is accomplished on a continuous conveyor running through an electrically heated Gehnrich oven. The equipment is entirely automatic in its operation, in that the operator at the unloading end, by a series of push buttons, may open or close the door at either end of the oven or progress the conveyor. Heating is entirely automatic, with automatic temperature control, and provides a continuous record of the heat cycle through which the castings pass.

After the cylinder heads are shrunk on the cylinders, they are black japanned and this japan finish baked in an electrically heated, truck-loading type oven having two compartments. The crankcases and other parts are finished with a gray enamel and these parts are baked

in an electrically heated, truck-loading type oven with three compartments.

Pattern Shops on Two Floors

ON the second and third floors are to be found the metal pattern shop and wood pattern shop respectively. These and the pattern storage department in the basement are the only parts of the building equipped with automatic sprinklers. Equipment in the wood and metal pattern shops is extensive and adequate. An electric elevator runs from the pattern storage department in the basement to the pattern shops on the second and third floors.

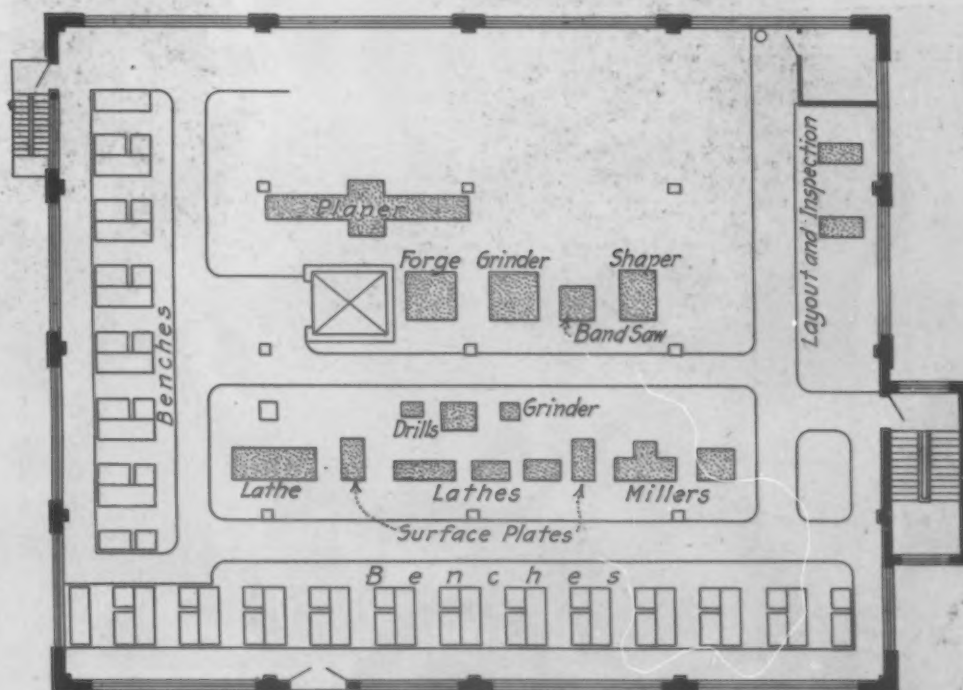
In one corner of the metal pattern shop are three automatic metal band-saw filing machines and an automatic band setter. The entire time of one man is here required to keep the supply of sharpened band-saws ready for the department below, one saw lasting only about 3 to 4 hr., after which it must be re-filed and occasionally reset. Each bench in the metal pattern shop has both air and gas available.

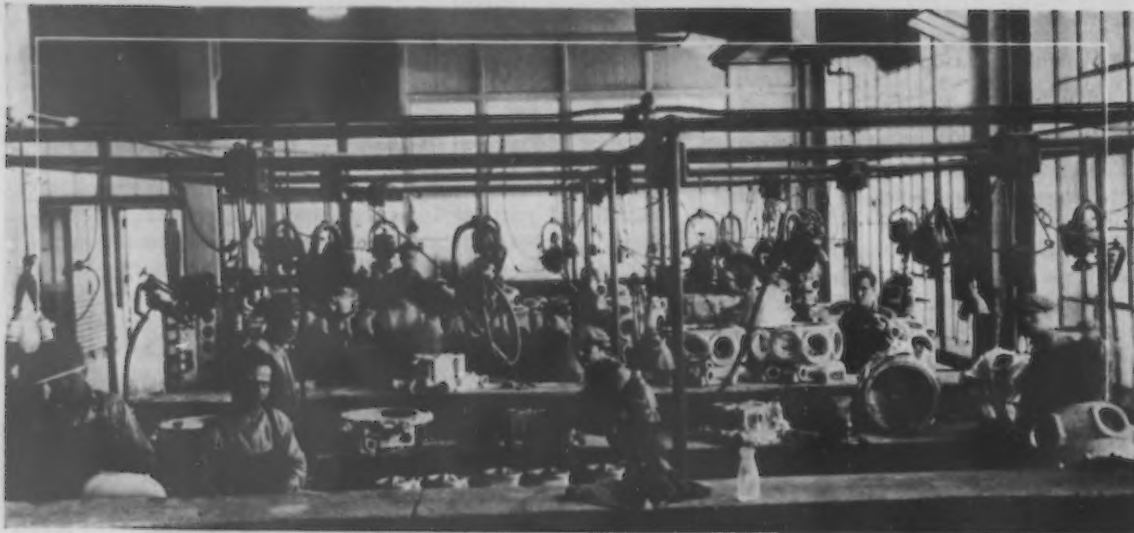
At present about 250 men are employed in the Wright foundry, 50 in the pattern departments, the remainder engaged in sand-mixing, core-making, molding, shaking out, cleaning, sawing, chipping, filing, pickling, heat treating, inspection, supervision and maintenance. The foundry offices, on the first floor, adjoin the inspection room.

Services Provide Comfort for Men

In both the foundry proper and the pattern shops, very efficient ventilation systems have been installed, so that linseed oil fumes, smoke, obnoxious gases, wood and metal dust are almost wholly withdrawn from the air. The ventilating systems for the pickle house consist of wooden ducts with a wooden fan outside of the building, discharging into a wooden stack. In the heat-treating room is equipment for air-cooling the castings, consisting of pits in the basement, through which air is blown by fans. The exhaust is used for heating the basement in winter, with a by-pass to the atmosphere in summer. These

METAL Pattern Shop Layout in Wright Foundry. Daylight on all four sides is assured, the shop being on the second floor of the building. The arrangement of benches and tools on the two pattern shop floors is much alike, with benches on two sides and heavy tools in the center





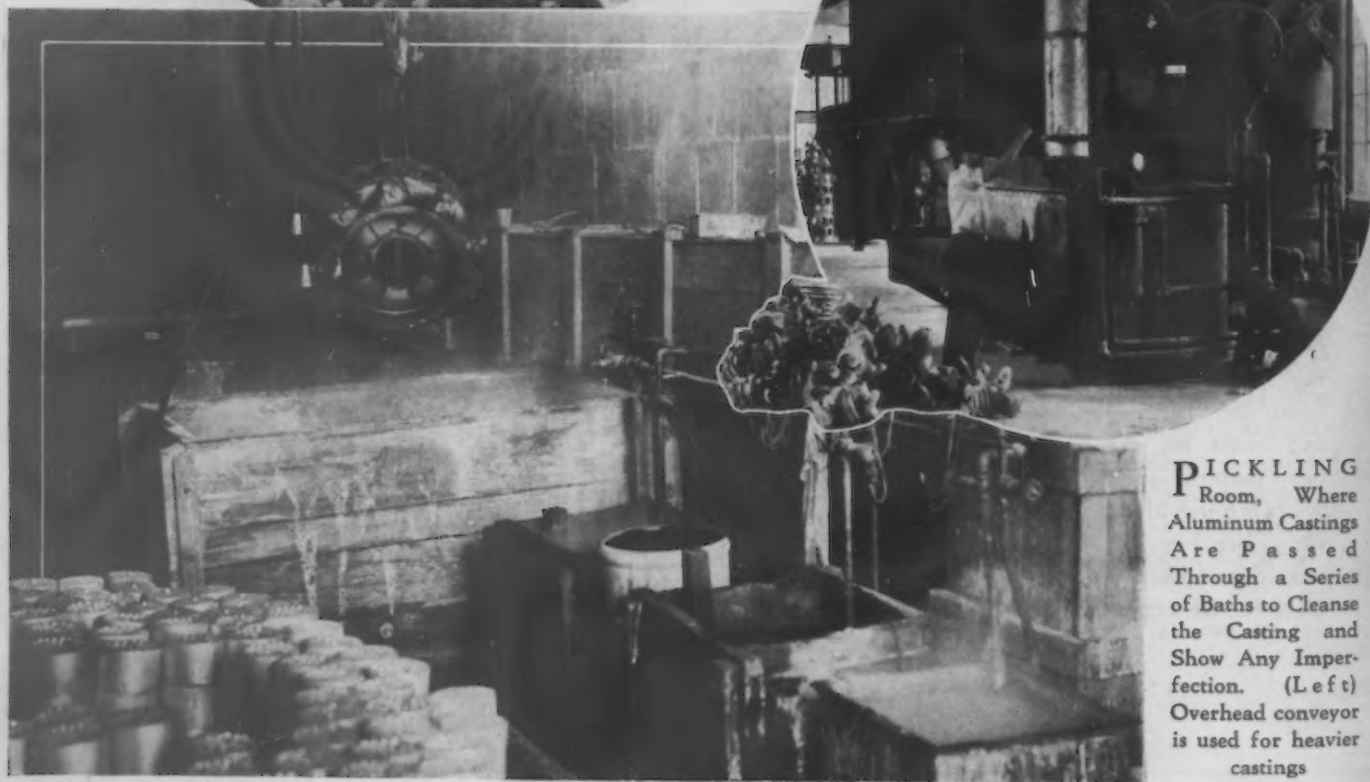
FLEXIBLE.
Shaft Department for Cleaning Castings. This is largely bench work, because of the lightness of the castings



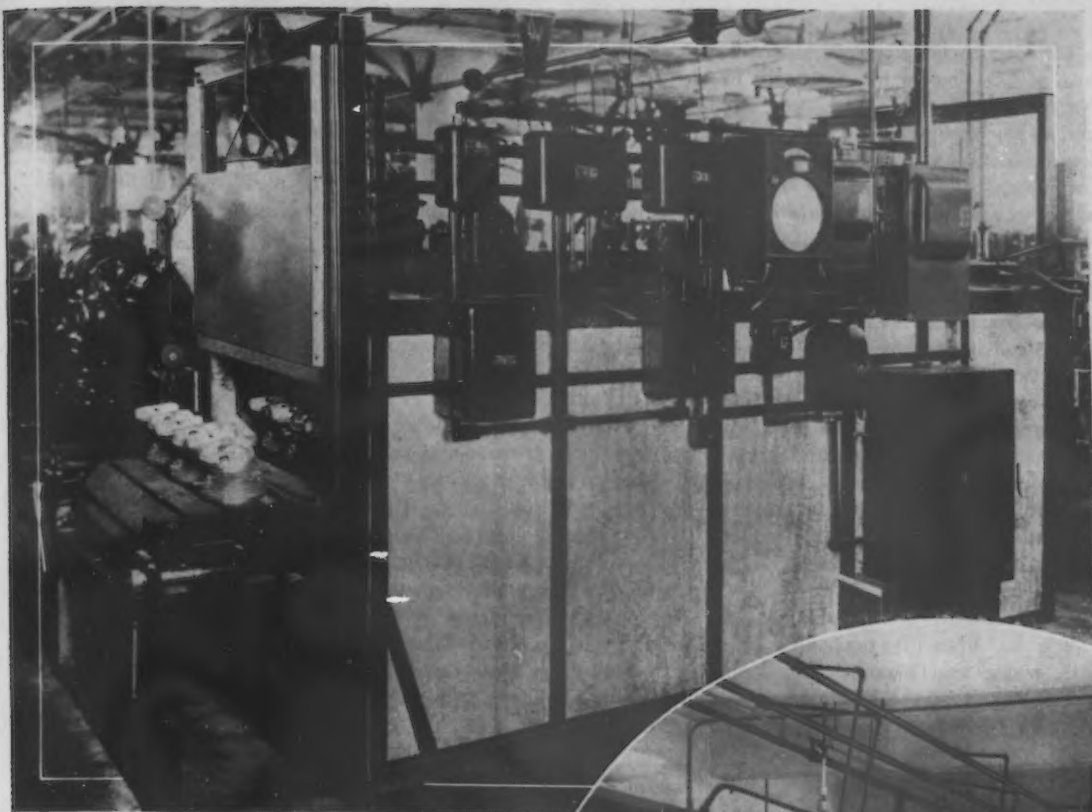
CYLINDER Head Shake-out (Left). After castings have cooled sufficiently they are conveyed on rollers over to this point, where the mold is separated from the casting

* * * *

AUTOMATIC Sand-Blast Table (Below) Where Aluminum Castings Are Cleaned



PICKLING Room, Where Aluminum Castings Are Passed Through a Series of Baths to Cleanse the Casting and Show Any Imperfection. (Left) Overhead conveyor is used for heavier castings



EXPANDING Furnace for Cylinder Heads to Fit Them for Shrinking on the Steel Cylinder. Below is a corner of the metal pattern shop, showing how air and gas are supplied to each man's bench



ON these two pages are characteristic parts of the foundry of the Wright Aeronautical Corporation, Paterson, N. J. Many of the subsidiary operations or pieces of equipment are here depicted.



ELECTRICALLY Heated Enameling Ovens, the Enamel Being Applied While Crankcases Are Held on Fixtures, as Shown. Japaning ovens are similar to these

ventilation systems are believed to be largely responsible for the complete absence of the smoky haze usually observed in foundries. No iron casting is done—only aluminum, kelmet metal and some bronze.

Interior walls in all departments are painted white down to shoulder height, below which they are dark. This, together with the large window area, entirely obviates the necessity for artificial interior illumination except during the late hours of the afternoon in winter.

Even the basement is well lighted and clean. It contains, in addition to sand storage bins, metal, pattern and general storage, the air compressor room, the oil supply pumps, the lower section of the electric heat-treating furnaces, a large, well-ventilated metal locker room, a spacious wash room equipped with Bradley Washfountains, a row of shower baths and toilets. In addition to this there is ample space for a rest room and cafeteria, which may be installed later. Aluminum alloy "ingots" are stored in the basement on sheet steel floor skids, which are handled by electric lift truck to the elevator and thence to the melting furnaces.

Along the ceiling of the basement runs the piping for the equipment above, such as high-pressure air, low-pressure air, fuel oil, gas, water and steam. The main distributing switch room is located in the basement also. To this is supplied 4150 volts of Public Service current.

Tying Up Production Control with Materials Handling

AN electric washing-machine manufacturer, before installing an overhead tramrail system, had the usual type of stockroom, consisting of long rows of bins in which the smaller parts were kept, and four-wheeled trucks cluttered all over the place, in which the larger parts were kept. Operation of this plant was described before an engineering meeting in Akron, Ohio, by E. T. Bennington, Cleveland Electric Tramrail Division, Wickliffe, Ohio.

In assembling several models, several thousand different parts were used, consisting of screw-machine products, castings, pressed-metal parts, bars, angles, motors, switches, etc. The material was withdrawn from stock in the usual type of tote box of a size which would hold about 50 lb. of small screws. As an operator ran out of material his supply was replenished in containers of this size or in bundles of angles, rod, etc., depending upon the nature of the material being used.

If the stock of only one small part should unexpectedly become depleted, no more machines of this model could be assembled until the supply was replenished.

Definite Stock Runs Established

This manufacturer took the first step toward successful handling of his material when he established a definite stock run for each model of machine. He then purchased 300 steel containers, all of the same base dimensions and varying only in height. The cubical capacity of these containers was fixed so that there was a size to hold the exact quantity of any part required to complete the previously established stock order.

Assume that the established stock order of model X machines was 500. The purchasing department would purchase the various parts required, in the quantity which provided the lowest overall price.

When these parts were received, 500 of them would be put into one container, if only one piece was used on each machine. If ten pieces were used on each machine, 5000 would be placed in the proper-size container as they were received, and checked in the receiving department.

Where parts were too large to get into one container in quantities of 500, these were placed in two containers or five containers, and those containers plainly marked $\frac{1}{2}$

transformed here to 440 volts for power and 110 volts for lighting. Feeders run to the different power and lighting panels for all of the lights, motors, and furnaces.

In the basement the partitions of the sand bins are of wood, but all of the others, such as those of the metal storage and pattern storage, are of wire grating. This allows free circulation of air and an unobstructed penetration of light.

A spur track runs along the outside wall, the full length of the building on one side. This makes it possible for the incoming sand to be chuted directly to the bins by portable conveyor. Incoming metal is unloaded from cars on to a spiral gravity conveyor which dumps it out on to a metal truck frame, which needs to be wheeled only a few feet inside of the metal storage room. From there it is transferred to the furnace room on the main floor by a sidewalk-type elevator of 3-ton capacity.

Heat is supplied to the building by unit heaters. Those on the main floor are fed by steam at high pressure, and the trap discharge at low pressure is used for supplying unit heaters in the basement, which operate on a vacuum system, the condensate being returned to the boiler room. A 20,000-gal. fuel oil tank is buried outside at one end of the building, and the oil is pumped to the core ovens, melting furnaces and elsewhere as needed. A 10,000-gal. core oil tank is in the yard, near the fuel oil tank.

stock order or $\frac{1}{5}$ stock order, to conform to the quantity they held. There were also a few cases where several kinds of very small parts were grouped into one container. These were parts which did not require any manufacturing operations before assembly. They were placed in this container in such a way that they did not become mixed up, being separated from each other by partitions.

Those parts which did not require manufacturing or finishing were moved to the machines as the schedule of each department permitted. After the completion of the machine operation they would be moved back into stock to await assembly. This relieved floor congestion in the manufacturing department.

Better Control Over Operations and Stock

Aside from the saving effected in handling large units at one trip, and eliminating rehandling, the inventory system, cost system, and record of material lost in manufacturing operations could be more accurately accounted for.

Since a tramrail system was employed to handle these containers, with a special automatic grab that enabled the operator to attach or detach the load from the cab without the aid of anyone on the ground, these containers were piled four or five high, and aisle space was entirely eliminated. The capacity of the stockroom was increased about 400 per cent, and the cost of a new building which otherwise would have been necessary under the old scheme of things was saved entirely.

Hardness of Brinell balls for hardness testing machines has been investigated by the British National Physical Laboratory. For these very hard steels a Vickers hardness tester using a diamond cone is suitable. Brinell balls for testing steels whose hardness number does not exceed 500, should have a diamond hardness number (corrected for the curvature of the ball) not less than 900. For Brinell tests on material between 500 and 630 hard, "work-hardened" balls should be used. A file test can also be used as a rough indication of the surface hardness of balls. If a ball can be scratched by a new smooth file its corrected diamond-hardness number is probably below 850.

Strength of Zinc Base Die Castings

Improvement Has Been Large Recently—Gravity and Pressure Methods—Types and Relative Merits of Alloys Available

BY ROBERT M. CURTS*

ONE of the outstanding features in the recent development of zinc base die casting alloys is the remarkable improvement which has been made relative to physical properties. These improvements have been brought about through a systematic study of the effect of the deliberate addition of other metals to zinc, and by a careful study of the effects of certain metallic impurities which are likely to occur in the raw materials or which sometimes occur because of thoughtless contamination. Zinc base die casting alloys are now available which will make strong, sound and permanent castings. Tensile strength of from 45,000 to 50,000 lb. per sq. in. and initial impact strength of well over 100 ft.-lb. per sq. in. can now be obtained through the specification of the proper zinc base alloys.

Inasmuch as zinc base alloys are cast by several methods, and because the casting method not only determines the type of alloy which can be used but also influences the physical properties of the castings, it seems advisable to briefly consider these several methods and to

limit the major part of the following dissertation to the one type which recently has become so popular.

Gravity and Pressure Methods Compared

In a broad sense, the term die casting includes both gravity and pressure castings. As implied, the former method relies on the force of gravity to distribute the



Fig. 1 — Ornamental Zinc Lamp Base Made by the Hand - Poured Gravity or Slush Casting Method (at Left)



Fig. 3—Washing Machine Agitator—a Zinc-Base Die Casting Weighing 7 3/4 Lb. and Having a Diameter of 13 In.

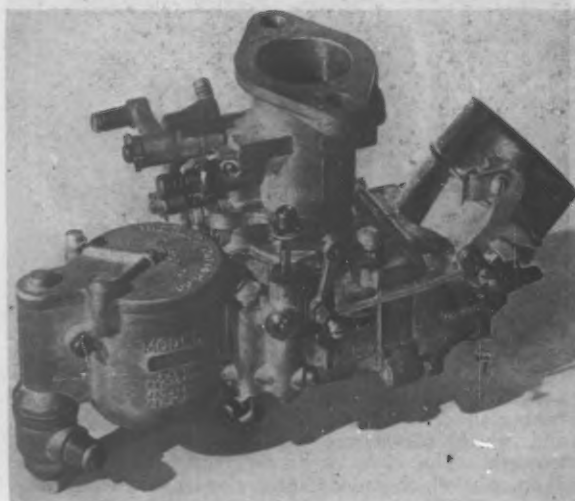


Fig. 2—Automobile Carburetor Made Up of Several Assembled Zinc-Base Die Castings (Above)

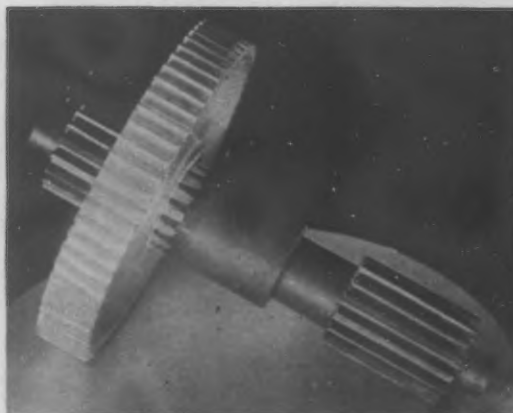


Fig. 4—Idler Gear for Speed Reducer Used on an Electric Hoist. Note the 4-in. (diameter) gear which has been cast around the 1 1/8-in. axle

*Technical Service, New Jersey Zinc Co., New York.

molten metal throughout the various cavities of the die, while the latter method employs the application of artificial forces, either pneumatic, mechanical, or a combination of both. In this process pressures ranging from less than 100 lb. per sq. in. and up to 2000 lb. per sq. in. are used. The higher pressures are usually employed where high rates of production are necessary and where the appearance of the surface is a primary factor.

Gravity castings are sometimes classified as slush castings (Fig. 1) and permanent mold castings. They are usually hand poured and necessitate the use of alloys having rather high fluidity. It is quite common practice to use high-grade, unalloyed zinc for this purpose. Castings of this type have a relatively low tensile strength (8000 to 10,000 lb. per sq. in.) and are used primarily in the production of ornamental objects and toys. Stronger castings may be made by the gravity method by using zinc alloys containing aluminum, copper and,



Fig. 5—Electric Hoist Motor Housing—(Weight 5 lb., Length 6 in., Diameter 6 in.). Note the design of the casting which distributes the shrinkage about the core and which allows minimum weight and maximum strength. The $\frac{1}{8}$ -in. walls are reinforced with eight $\frac{3}{8}$ -in. ribs which are an integral part of the casting

sometimes, magnesium—although the addition of these metals to the zinc influences the casting properties and often necessitates greater care when used in connection with complicated dies.

Possibly many readers have not realized the possibilities of zinc base alloy castings because they have considered castings of this gravity type only. Pressure die castings are invariably much stronger because of the difference in the structure of the cast metal, and because the types of alloys which can be cast by this method are very much stronger. Increased impact and tensile strengths, together with greater ease and rapidity of casting, have popularized the pressure casting method to the extent that it consumes about 90 per cent of the zinc and zinc base alloys now used in castings.

In order to prevent any confusion, and because pressure die castings are by far the most widely used, the author limits further discussion to this field.

The automobile industry consumes well over 50 per cent of the zinc base die castings which are now being produced, although the past year has witnessed the introduction of similar castings into many new and interesting fields. Practically all automobiles are equipped with castings made of the newer and stronger zinc base alloys. The recently perfected and widely adopted fuel pump, illustrated by Fig. 6, is made of Zamak, the 4-3-0.1

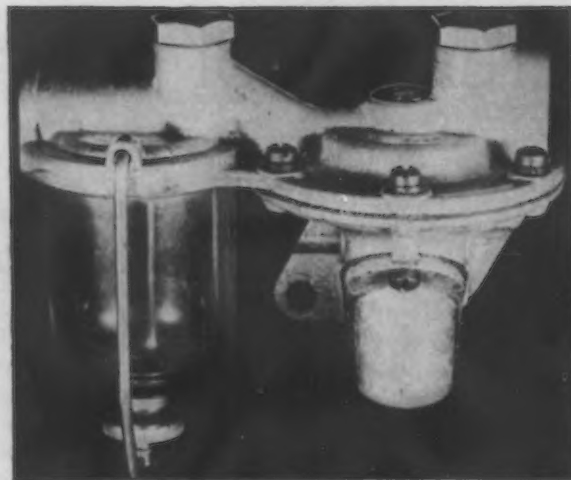


Fig. 6—Automobile Fuel Pump Composed of Two Die Castings Made of the 4-3-0.1 Alloy

alloy, which will be discussed in detail later on. Carbureters, lamp housings, cowl lamp brackets, windshield wiper housings, steering wheel parts, radiator caps, magneto and generator housings, spark and throttle levers, emblem bars, robe rail and foot rail brackets, instrument panels, speedometer parts, inside and outside hardware, clock frames and numerous other parts are now made of zinc base die castings.

Many Kinds of Zinc Base Castings

Varieties of zinc base die castings are also employed in the manufacture of numerous other articles, such as sewing machines, printing press accessories, moving picture machines, check writers, lighting fixtures, fractional horsepower motors, washing machines, gears, vending machines, sun lamps, toys, cash registers, locks, pencil

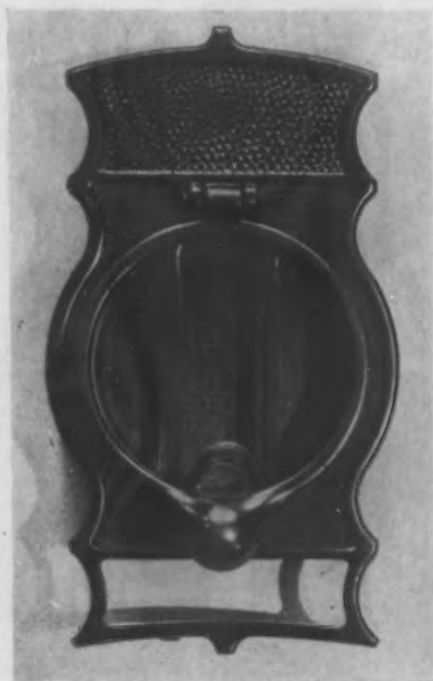


Fig. 7—Bronze-Plated Door Knocker Made of a Zinc-Base Die Casting

sharpeners, door closers, weighing machines, spray guns, radio chassis, radio loud speakers, plumbing fixtures, general house and furniture hardware, etc.

In scanning the foregoing list, it is at once evident that many of the applications noted impose rather exacting demands relative to tensile strength, resistance to breakage by impact, freedom from growth, and retention of physical properties. The improved zinc base alloys which are now being used are meeting these requirements. Not only do they meet specifications relative to strength, but they also lend themselves to the application of a great many attractive finishes including enamels, lacquers and almost any kind of plating. Nickel, chromium, cadmium and other metals commonly used for plating may be applied without difficulty.

The evolution of the strong alloys which may be had today is not the result of chance findings or over-night discoveries. It has been a slow evolution in which many factors had to be considered. Many alloys were made and tested. Primarily, research investigators sought alloys having high impact strength. But having accomplished this, their job was not finished. Ageing, due to intercrystalline oxidation and internal phase changes,



Fig. 8—Steel Inserts Used in Connection with Automobile Hardware

was determined for the alloys considered, and many of them had to be discarded because they failed to stand the tests to which they were subjected. Many other alloys "fell by the wayside" because they did not have suitable casting properties—for a good all-around alloy must not only have great strength, but must be free from hot shortness (cracking in the dies), and must have good fluidity and a liberal casting range. From the standpoint of finishing it must be easily machined, buffed, and plated.

Three Types of Die-Casting Alloys

At the present time there are three types of die-casting alloys in general use. The properties and merits of these alloys are reviewed in the following paragraphs:

1.—The commonly termed "Tin Alloy" contains approximately 6 per cent tin, 3 per cent copper, 0.5 per cent aluminum, and the balance zinc. This is one of the more antiquated zinc base alloys and has practically been displaced by the newer and stronger alloys. It has a relatively low tensile strength (approximately 24,000 lb. per sq. in.) and a low impact strength (17 to 23 ft.-lb. per sq. in.). It has an elongation of from 1 to 1.50 per cent in 2 in. and a Brinell hardness of from 57 to 61. Such physical properties did not invite the use of this type of alloy for the hundreds of applications which die castings are now serving. About the only justification for the use of this alloy, scant though it is, is that it is quite readily soldered. Soldering and the tin alloy go hand in hand, for a "chain is no stronger than its

*United States Patent No. 1,596,761, Aug. 17, 1926.



Fig. 9—A Group of Brass Inserts

weakest link" and if a weak soldered joint is necessary, a weak casting will serve. From the economic standpoint, this type of alloy is probably more expensive than the newer alloys because, although a low grade of zinc may be utilized, the cost of the copper-aluminum-tin combination with low-grade zinc will exceed the cost of the copper-aluminum and the copper-aluminum-magnesium combination used with high-grade zinc in the most recent alloys.

2.—The 4-3 or 5-3 alloy contains from 4 to 5 per cent of aluminum, 3 per cent of copper, and the balance high-grade zinc. This type of alloy has a tensile strength ranging from 37,000 to 43,000 lb. per sq. in. and an impact strength of about 100 ft.-lb. per sq. in. as cast. It has an average elongation of 2 to 3 per cent in 2 in. and a Brinell hardness of about 80. It has very good casting properties, being quite fluid and free from hot shortness. It can be cast with a smooth, even, fine-grained surface which facilitates subsequent buffing and plating operations, to which it is frequently subjected. It is easily machined and can be used in connection with steel, brass, bronze and other types of inserts.

3.—The "4-3-0.1" alloy (Zamak)* is composed of 4 per cent aluminum, 3 per cent copper, 0.1 per cent magnesium, and the balance high-grade zinc. This is the most recently developed alloy and, in many cases, it has replaced alloys of the 4-3 and 5-3 types. With a tensile strength of 47,000 to 50,000 lb. per sq. in. and an impact strength of well over 100 ft.-lb. per sq. in., this alloy is undoubtedly the best available at the present time. It should be employed when long life and service are required of the finished casting. It is easily cast in complicated dies, although some care must be exercised in the gating of the die in order to prevent overheating which may result in cracking. It affords a smooth, hard, fine grained surface which is particularly suitable for plating and other finishing operations. It can be soldered, if necessary, although soldering is to be discouraged because a soldered section usually weakens the casting as a unit. The 4-3-0.1 alloy is somewhat harder than the tin alloy or the 5-3 or 4-3 type of alloy, having a Brinell hardness of from 80 to 90. It is easily machined and



Fig. 10—Chrome-plated Die-Cast Door Handle with Steel Insert

Fig. 10a—Same as No. 13 After Severe Hammering at Points A and B

is a splendid alloy for use in connection with various types of inserts. (See Fig. Nos. 4, 8, 9, 10 and 11.)

The use of inserts is quite general in the die casting industry. These may be of steel, brass, bronze, porcelain, etc. Occasionally another die casting is used as an insert—usually to prevent a soldering operation. Figs. 8 and 9 portray several types of inserts and illustrate the manner in which they are “keyed” into the casting. The shrinkage of the alloy around the insert is just pronounced enough to anchor it so firmly that the casting must actually be broken if the insert is to be removed.

And if the casting is made of a high-grade alloy such as the 4-3-0.1 type, it will not break, as shown by Figs. 11-a and 12-a.

Fig. 10 shows a commercial automobile door handle which has been cast around a steel insert of the type



Figs. 11 and 11a—Steel Screw Inserts Cast in the 4-3-0.1 Alloy. Figure 11-a represents one of these inserts severely deformed but still firmly anchored in the casting

shown in Fig. 11. This door handle was placed in a vise and severely hammered, resulting in appreciable deformation without breaking. (See Fig. 10-a).

Another example of the toughness of good zinc base die castings is illustrated by Figs. 11 and 11-a. In this case one of the steel machine screw inserts was hammered flat on the casting without coming loose from its anchorage or without cracking the casting.

Although the employment of inserts will obviously increase the cost of the casting, it is frequently possible to prove an economy in the finished product due to the elimination of machining and assembling costs.

Inserts are used to impart greater strength or elongation at localized points—affording the properties of a wrought structure where a cast structure would not serve satisfactorily. Door handle inserts exemplify this use. They are sometimes used to give hardness or special wearing qualities (Fig. 4), and are also employed to afford the special bearing properties of the bronze alloys. Specific electrical properties pertaining to either resistivity or conductivity may also be had through the use of inserts. Laminated pole pieces may be made an integral part of the casting to be used in the manufacture of electric appliances.

In this connection, the use of zinc-base alloys offers an excellent material which may be given special prop-

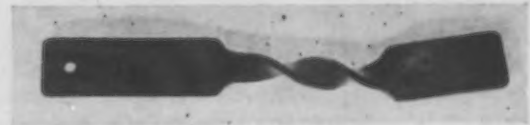


Fig. 12—Tensile Bar Die Cast of the 4-3-0.1 Alloy Twisted Through 360 Deg. Without Fracture

erties at local points without influencing the general economy afforded by the use of die castings. As a matter of fact, the die casting process is much more versatile in this respect than many other production methods which involve welding, soldering, brazing, or mechanical couplings.

The author is frequently asked to compare the physical properties of zinc-base die castings with castings made of other materials such as brass, bronze, iron and aluminum alloys. Due to the wide variation in the figures given for these materials it is rather difficult to make an accurate comparison.

A study of the various possible sources of available data reveals that the tensile strength of the 4-3-0.1 alloy is at least 24 per cent greater than sand cast brass or bronze, while the impact strength is lower than that of cast brass and about the same as that of cast bronze. Compared with cast iron, the 4-3-0.1 alloy is at least twice as strong with respect to tensile strength, and is greatly superior in impact strength. Sand cast iron has an impact strength of from 2 to 5 ft.-lb. per sq. in., as compared with well over 100 ft.-lb. per sq. in. for the 4-3-0.1 alloy. The toughness and ductility of zinc base alloys are quite well illustrated in Fig. 13 which represents a die cast tensile bar twisted through 360 deg. without fracture.

It is estimated that the production of zinc-base pressure die-castings consumed well over 60,000,000 lb. of high grade zinc in 1928. The consumption for 1929 will exceed that of 1928. New fields are presenting themselves every day. Many complicated parts which were not economically possible with other methods of production are now being made of strong, high-quality zinc-base alloys by the die-casting method.



Fig. 13—This Well-Known Pencil Sharpener Is Made of the 4-3-0.1 Alloy. It was dropped 55 ft. to a concrete floor without any evidence of fracture. It could not be fractured by the application of 21.57 ft.-lb. force, which was the capacity of the testing machine.

High Speed in Cupola Melting

Metallurgical Advantages Are Many—Average Speed
in Over 200 Foundries Is Slow—Conception
of a Composite Cupola

THAT the economic advantages of melting iron in a cupola at the best speed obtainable are evident to all foundrymen was the contention of W. N. Truxell, research engineer, Potter Coal & Coke Co., Greensburg, Pa., in an address entitled "The Metallurgical Advantage of Higher Melting Speed," delivered at the December meeting of the Philadelphia Foundrymen's Association, Manufacturers Building, Wednesday evening, Dec. 11. The attendance of local foundrymen was large.

In his extemporaneous speech, Mr. Truxell said that the aim of most foundrymen is to melt iron at the cupola's rated speed or better, and he pronounced it his purpose to point out some not so obvious, but none the less real, advantages which follow such practice, properly carried out. His arguments and deductions on melting practice were collected from personal observation of over 200 foundries in Canada and in the United States, east of the Mississippi River.

Average Cupola Operation Only 75 Per Cent

TO begin with, said the speaker, it has been found that the average cupola is operated at approximately 75 per cent of its rated speed, although there are a few which are up to and even higher than the rated speed, while others are considerably below the average. To obtain extremely hot iron it has long been contended that speed necessarily must be reduced. It has certainly been learned that hot iron and rated speed can be obtained readily with the speed even increased.

When iron is melted slowly and at a high temperature, the charging of excessive coke is found to be the usual practice; but this term, excessive coke, requires some explanation. Most foundrymen think of coke weight as in ratio to iron rather than in comparison to air, so that, in the case of excessive coke and slow melting, one finds the hot area in the cupola limited in height and with poor conditions for combustion. Hot iron may be obtained this way, and it is being done quite frequently, although many other factors enter in. It is evident in these circumstances that the iron has quite a period of time and favorable opportunity to undergo changes such as losing silicon and phosphorus and picking up carbon and sulphur. Careful comparisons, however, show that iron melted in this way will vary so greatly from the iron which is charged as to be almost unrecognizable.

Loss and Pick-Up of Elements

WHEN a cupola is melting at capacity speed or better, that is, 10 tons an hour for a 10-ton cupola, and delivering equally hot metal, the difference between the analyses of metal charged and metal poured shows a likeness that encourages the melter in his conviction that he can deliver iron at the spout which will meet specifications. Many foundries are losing 0.20 to 0.25 per cent silicon and phosphorus while picking up 0.10 per cent sulphur as compared to others with a silicon and phosphorus loss of 0.10 per cent and a sulphur absorption of 0.05 per cent. It is rather significant that these figures vary directly with the melting speed.

As to the picking up of carbon, several large foundries are melting a high percentage of steel in an endeavor to obtain high tensile strength, aiming at low total carbon, and are obtaining 3 per cent carbon and under regularly by operating at high speed. It should be sufficient to encourage small foundrymen to at least investigate the possibilities of their own melting equipment when one realizes the high melting speeds maintained by our automobile foundries and the uniformity of their output.

Foundry cupolas and also the method of their operation vary to an almost unbelievable degree. The time is rapidly passing when every foundryman regards his cupola and foundry conditions unique. Today, one realizes that the cupola is no longer "she," but a piece of mechanical equipment, and therefore subject to the same laws of mechanics and physics.

A Composite Cupola Described

DESCRIBING what he termed a composite cupola, Mr. Truxell declared that the composite average of American cupolas today, which are operating economically and efficiently, will be found to conform to the following general description:

The height of the charging doors from the tuyeres is 13 to 15 ft. This height varies only as the size of the material to be charged and not with the diameter. The cupola which will carry eight charges to the charging door has been found to lie well within these dimensions and to operate ideally as regards blast air pressure, sufficient stock being present to take advantage of the heat generated, and yet not excessive to the point of requiring additional blast pressure to penetrate the mass or to necessitate additional coke to replace fuel loss by premature burning high in the stack.

As regards the tuyeres, our composite cupola has its single continuous tuyeres with a height equal to one-twelfth of the diameter as lined. This height gives a tuyere ratio to the cupola of three to one, which, of course, in turn, gives a low blast pressure. A large majority of foundries are approximating this tuyere condition.

Coming to the crucible or reservoir at the cupola, there is a large variable due primarily to local conditions in jobbing foundries. Our average, however, for an economical cupola melting hot iron is a crucible 12 in. high from sand bottom to tuyere.

In a cupola which conforms to these general specifications, operated with the correct amount of air, the melting zone will be found to extend to approximately 24 in. above the tuyeres with its center lying about 16 in. above them. The height of the melting zone will vary with the kind of coke used. A dense, heavy, slow-burning fuel tends to lower the zone. The ideal coke for fast melting should contain a high total carbon and a high percentage of volatile matter with an open structure. High-volatile properties mean easy ignition, particularly when in conjunction with an open structure permitting easy penetration of air.

(Concluded on page 1705)

River Shipments Gaining Rapidly

Ohio Carries Large Tonnages of Iron and Steel—

Gain of 339 Per Cent, 1917 to 1927—

One-Sixth Enters Mississippi

IRON and steel shipped on the Ohio River in 1927 accounted for 981,999 net tons out of a total river traffic of 20,128,518 tons, and were the chief commodities having a through movement on that stream. The rapid growth of inland waterways traffic, prominently reflected in the increasing iron and steel movement, is strikingly shown in a report entitled "Transportation in the Mississippi and Ohio Valleys," issued by the Board of Engineers for River and Harbors of the War Department in cooperation with the Bureau of Operations, United States Shipping Board.

The vast bulk of iron and steel tonnage moving by water originates in the Pittsburgh district on the Monongahela and Ohio Rivers, shipments by the Allegheny River being small and declining, dropping to only 9676 tons in 1927 from 55,087 tons in 1924. In contrast with this were the heavy increases in iron and steel tonnage moving by the Monongahela and Ohio Rivers, though that moving by the Monongahela showed a slight dip in 1926 to 571,284 tons from 580,126 tons in 1925.

But the heavy gain in the steel traffic on this river is shown by comparing the figure of 957,278 tons in 1927 with 371,675 tons in 1924. The iron and steel movement by the Ohio, a great proportion of which comes from the Monongahela, was 575,462 tons in 1926, 535,543 tons in 1925 and 550,363 tons in 1924. The total Ohio River traffic in 1925 was 15,737,000 tons and in 1926 it was 19,754,000 tons, duplications being eliminated. The Ohio River traffic made a gain of 339 per cent in 1927 over the 4,600,000 tons

of 1917. The traffic on the Ohio River system for 1928, after eliminating all known duplications, was more than 46,000,000 tons, or about 69 per cent of the total of 62,500,000 tons for the entire Mississippi River system.

Large Savings in Transportation Costs

With the completion of the canalization project for the Ohio River, the report said, the traffic will undoubtedly make further important gains. The large steel companies, the public service corporations and common carriers are all planning to use the river more intensively. Deducting the fixed charges, including interest on the cost of improvements, operation, care and maintenance charges, the net saving in transportation costs in the ton miles of traffic as carried on the Ohio River in 1925 was found to be \$11,387,000.

It was further declared that, during the last 27 years, the Monongahela improvement has paid for itself and has earned a surplus of about \$100,000,000, returned to the general wealth of the nation through reduced transportation costs.

Movement Originates Above Pittsburgh

Dealing with the transportation of iron and steel by waterways, the report stated that the large steel corporations in the Pittsburgh district, along the banks of the lower Allegheny, Monongahela and upper Ohio Rivers, have in recent years been shipping large quantities of iron



and steel products to lower Ohio and Mississippi River points as far as New Orleans, a distance of 1959 miles. These products have moved on barges taken from the equipment of their long-established coal transport service on the Monongahela River and converted temporarily to the new use, as well as by covered barges constructed especially for the purpose.

"The use of water routes for shipment of iron and steel products is a natural development resulting from increased foreign and domestic competition," said the report. "The all-rail rates from the Pittsburgh district to the developing markets of the Southwest and the Pacific Coast are unfavorable as compared with rates from nearer plants and from Europe. Low-cost barge transportation, however, enables the plants in the Pittsburgh district to reach the markets of the Southwest, and it supplies an all-water route to the Pacific Coast, supplementing the rail-water route via North Atlantic ports, both of which afford savings, compared with transcontinental rates."

Many Plants Feed into the System

Analyzing the iron and steel movement, the report stated that of the 575,462 tons shipped in 1926 by the Ohio, 216,835 tons moved downstream from plants located on the Monongahela, while lesser amounts were shipped from Woodlawn, Pa., Ironton, Ohio, and points on the Tennessee. The principal receiving points on the Ohio were Ambridge, Pa., 71,197 tons; Bellaire, Ohio, 11,567 tons, and Louisville, 100,410 tons. Of the downstream movement, 193,628 tons passed from the Ohio to the Mississippi. The principal receiving ports on the Mississippi were Memphis, with 102,917 tons, and New Orleans, with 84,297 tons, while smaller quantities were barged to Gulfport, Miss., and Mobile, Ala. A total of 39,854 tons passed from the Ohio to the Mississippi for delivery at St. Louis and Chicago. Of this quantity, 32,785 tons of pig iron went to the latter and 7069 tons to the former.

The upstream movement of iron and steel during 1926 totaled 44,987 tons, according to the report. Shipments were made from New Orleans and Memphis on the Mississippi, while Bellaire, Ohio, with 19,366 tons, and Ben-

Iron and Steel Products Shipped on Ohio and Mississippi Rivers

River	(In Net Tons)			
	1927	1926	1925	1924
Monongahela	957,278	571,284	580,126	371,675
Allegheny	9,676	10,927	16,999	55,087
Ohio	981,999	575,462	535,543	550,363
Mississippi:				
Mouth of Missouri to				
mouth of Ohio	23,479	21,644	20,840	10,045
Cairo to Memphis	292,028	169,603	86,841	42,762
Memphis to Vicksburg	128,214	79,065	46,228	33,917
Vicksburg to New Orleans	133,208	76,023	43,993	32,567

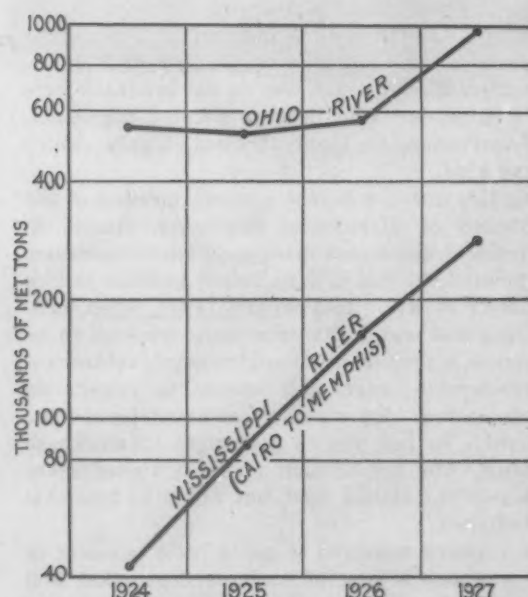
wood, W. Va., with 18,864 tons, were the outstanding ports shipping tonnage upstream on the Ohio.

The upper Mississippi was recently utilized by a prominent steel company to forward a barge of steel from its plant on the Ohio to Minneapolis. Another consignment of 2500 tons of pipe was taken from Birmingham by railroad to Memphis and barged to St. Paul and Minneapolis. The use of the rail-and-barge route for the latter shipment, instead of the all-rail route, it was pointed out, resulted in a substantial saving in freight rates to the consignee.

Some of the steel companies utilize the Ohio for inter-plant movements of semi-fabricated materials. One company, with plant at Charleston, W. Va., on the Kanawha River, moves high-grade tool steel from steel plants in the Pittsburgh district. The greater part of the steel moving from the Ohio to the Mississippi, it was added, consists of steel pipe destined to the Mid-Continent fields.

Character of Floating Equipment

Barges are now generally constructed of steel and the tendency in coal, gravel and steel traffic is to build hulls having a capacity of 800 to 1000 tons. Records of June 30, 1927, show that 60 per cent of the barge capacity in use in the Ohio Valley is in steel barges having a capacity of over 500 tons, 5 per cent in steel barges having a capacity of less than 500 tons each and 35 per cent in wooden barges. Barges for coal, sand, gravel, stone, unmanufactured steel, etc., were said to be of the open type.



Showing Rapid Growth of Mississippi River Iron and Steel Traffic

Iron and Steel Moving Downbound on Ohio and Mississippi Rivers, 1926

Shipped From	Net Tons	Received At	Net Tons
Allegheny River.....	2,347	Neville Island, Pa.....	94
Monongahela River... 216,835		Ambridge, Pa.....	71,197
Neville Island, Pa....	1,966	Steubenville, Ohio....	6,475
Ambridge, Pa.....	1,514	Mingo, Pa.....	7,559
Woodlawn, Pa.....	61,737	Benwood, W. Va.....	1,882
Midland, Pa.....	250	Pultney, Ohio.....	3,415
Steubenville, Ohio....	24,062	Bellaire, Ohio.....	11,567
Martins Ferry.....	20,709	Parkersburg, W. Va....	245
Wheeling, W. Va.....	41	Point Pleasant, W. Va.	1,043
Sistersville, W. Va....	204	Charleston, W. Va....	5,794
Parkersburg, W. Va....	912	Huntington, W. Va....	278
Pomeroy, Ohio.....	748	Ironton, Ohio.....	1,016
Kanawha River.....	782	Hanging Rock, Ohio....	3,721
Point Pleasant, W. Va.	1,016	New Boston, Ohio.....	2,061
Ironton, Ohio.....	65,684	Portsmouth, Ohio.....	1,966
Portsmouth, Ohio....	2,027	Cincinnati.....	8,272
Rome, Ohio.....	39	Louisville.....	100,410
Pryse, Ky (Kentucky		Kosmosdale, Ky.....	385
River).....	269	Dam 43.....	2,400
Louisville.....	8,574	Dam 46.....	1,047
Evansville, Ind.....	54	Evansville, Ind.....	9,242
Tennessee River.....	60,566	Dams 50, 51, and 52..	4,092
Paducah, Ky.....	2,379	Paducah, Ky.....	54
Cairo, Ill.....	18,731	Brookport, Ky.....	8,920
Mouth of Missouri		Metropolis, Ill.....	10,561
River.....	1,441	Joppa, Ill.....	8,300
St. Louis.....	16,329	Dam 53.....	821
East St. Louis, Mo....	3,409	Mound City, Ill.....	2,379
Memphis.....	684	Cairo, Ill.....	3,891
		St. Louis.....	7,069
		Chicago.....	32,785
		Commerce, Mo.....	1,441
		Cairo, Ill.....	20
		Memphis.....	102,917
		Vicksburg, Miss.....	3,140
		Baton Rouge, La.....	1,526
		New Orleans.....	84,297
		Gulfport, Miss.....	86
		Mobile, Ala.....	941
Total.....	513,309	Total.....	513,309

Covered barges, it was pointed out, have recently come into use for transporting manufactured steel, cement and

Iron and Steel Moving Upbound on the Ohio and Mississippi Rivers, 1926

Shipped From	Net Tons	Received At	Net Tons
New Orleans.....	1,049	Vicksburg, Miss.....	568
Memphis.....	243	Memphis, Tenn.....	11
Cairo, Ill.....	602	Cairo, Ill.....	274
Evansville, Ind.....	1,542	East St. Louis, Ill....	54
Leavenworth, Ind....	200	St. Louis.....	385
Newport, Ky.....	200	Paducah, Ky.....	52
Cincinnati.....	1,282	Louisville, Ky.....	307
Point Pleasant, W. Va.	180	Mound City, Ill.....	550
Parkersburg, W. Va....	77	Ironton, Ohio.....	200
Charleston, W. Va....	306	Charleston, W. Va....	1,088
Wheeling, W. Va.....	375	Green River points...	1,435
Bellaire, Ohio.....	19,366	Marietta, Ohio.....	180
New Boston, Ohio....	701	Wheeling, W. Va....	77
Benwood, W. Va.....	18,864	Steubenville, Ohio....	19,565
		Mingo, Pa.....	8,169
		Munhall, Pa.....	11,197
		Braddock, Pa.....	169
		Pittsburgh.....	706
Total.....	44,987	Total.....	44,987

miscellaneous freight, while specially constructed tank barges are used for transporting oil and gasoline.

Recent completion by the United States Engineer corps of the canalization project for the Ohio River, comprising 50 locks and dams, provides a year-around 9-ft. channel from Pittsburgh to Cairo, Ill., 968 miles. New projects are mentioned for the inland waterways system. In the summary the report expressed the hope that communities along the Ohio will recognize the importance of constructing suitable terminals to facilitate the development of common carrier service on this river.

"The outlook is for further increase in the use of the Mississippi River system for movement of the products of agriculture, mining and industry, as well as for essential products consumed in the Mississippi basin."

Encouraging Education and Training for Industry

ENGINEERS as a rule give little thought to the young men who are growing up in industry and learning industrial work. Of course, it is fashionable to patronize a young engineer and help him over his early strenuous years. But such patronage is different from an understanding of the need of American industry as a whole for trained young men, and young engineers are quite different from the type of young men who do not graduate from a technical college, but who hope to become mechanics, technicians, draftsmen, or highly trained, highly skilled experts of any kind.

Discussing this question before a recent meeting of the American Society of Mechanical Engineers, Harold S. Falk, vice-president and works manager Falk Corporation, Milwaukee, pointed out that it is no longer possible to hire skilled mechanics at will. In February, 1927, when business was rather dull and 40,000 men were reported to be idle in Milwaukee, a prominent oil-engine manufacturer received a considerable order, and wanted to engage 65 high-grade mechanics. Among all those unemployed men, it was impossible to find the 65 mechanics or anywhere near that many. The employment manager visited other cities in a search for skilled men, but failed to assemble the required number.

A certain foundry managed to get a little business in 1924, which was also a year of business depression, and was unable to engage 18 first-rate foundrymen, although the number of unemployed in the city at the time was as great as ever. Our industries are clearly confronted with the responsibility for training their own mechanics and experts.

At first sight, this may not appear to be a problem of

the engineering profession. However, the welfare of the profession depends upon the progress of industry. To this extent, at least, engineers are concerned with these problems of industrial training. Although much has been done in apprenticeship in various centers and individual industries, a mere beginning has been made, and very few manufacturers, comparatively speaking, have given the question much attention.

Designing for Safe Operation

Some fundamentals of design should be embodied in every electrically-propelled overhead carrier put in service. Such a carrier should have the operator's cab supported separately from that part of the carrier which carries the load. The practice sometimes followed, of carrying the operator's cab from the main body of the hoist is to be severely condemned, in the opinion of E. T. Bennington, Cleveland Electric Tramrail, Wickliffe, Ohio, speaking at an engineering meeting in Akron.

It is not uncommon for an operator to try to pick up a load which either is attached to the floor or is held in place by sticking or shifting of piles, with the result that the lifting effort is many times that for which the carrier is designed, and something gives way. If it is a king pin, a wheel pin, load bar or hoist, the operator suspended from the load-carrying member will surely drop with that member. But if he is separately supported on the rail, the rail itself must break before he can be injured. There is then little likelihood of his ever reaching the ground, as the rail is always the strongest member on any mono-rail system.

Turning With Shallow Cuts at High Speeds

Experiments Include Effect of Composition and Heat Treatment Upon Tool Performance—Drilling Also Discussed at A. S. M. E. Meeting

RESULTS of fundamental studies in the fields of turning and drilling were outstanding features of the cutting of metals session held in connection with the fiftieth annual meeting of the American Society of Mechanical Engineers in New York last week.

The data relating to turning were given in a paper on "Turning with Shallow Cuts at High Speed" by H. J. French, formerly senior metallurgist, Bureau of Standards, now with the research department of the International Nickel Co., Bayonne, N. J., and T. G. Digges, associate metallurgist, Bureau of Standards. The paper on drilling, by O. W. Boston, college of engineering, University of Michigan, and C. J. Oxford, chief engineer, National Twist Drill & Tool Co., Detroit, was on the "Power Required to Drill Cast Iron and Steel." The session at which these papers were presented was held Dec. 3 under the joint auspices of the A.S.M.E. special research committee on cutting metals and the machine shop practice division. A. H. d'Arcambal, Pratt & Whitney Co., Hartford, Conn., was chairman.

The authors of the paper on "Turning with Shallow Cuts at High Speeds" pointed out that most studies of turning have been in connection with relatively coarse feeds and deep cuts. Such studies have made it possible to predict with accuracy sufficient for many practical purposes the cutting speeds that can be used economically in

rough turning. But comparable information has not been made available for the shallow cuts used in finishing.

Lathe Tests Made with Two Tools in One Holder

Experiments dealt with in the report relate to a new method of test for lathe tools taking shallow cuts. To give a broad background for useful interpretation of results, the new method was used first in a study of the effects of feed, depth, cutting liquids and tool form upon cutting speed. It was then used in a study of the effect of composition and heat treatment upon the performance of carbon and high-speed steel tools, and the results compared with those obtained in the customary rough-turning tests.

The method of test makes use of two tools set at equal depths in one tool-holder (see Fig. 1) and is based upon the fact that the "trailer" or following tool will not cut so long as the "leader" or cutting tool shows no wear. One of the advantages of this method of test is its simplicity, as the only special equipment required is the tool-holder; another advantage is that there is nothing to interfere with the rigidity of the test tool. For the most part the test tool used had a broad nose and was of the form and dimensions shown in Fig. 2. A round-nose tool

(Continued on page 1704)

THE Special Tool Holder (Fig. 1) Used in the Shallow Turning Tests Is of Simple Design. The form and dimensions of the test tool are shown in Fig. 2 and those in the round-nose tool used for the trailer in Fig. 3

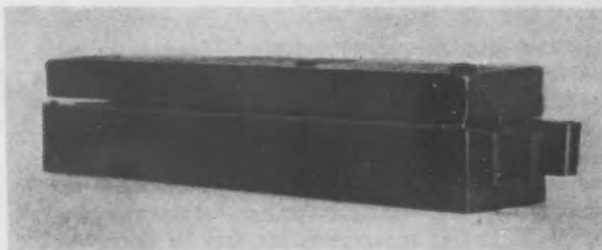


FIG. 1

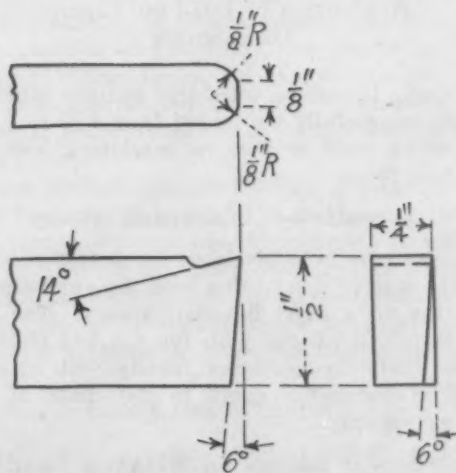


FIG. 2

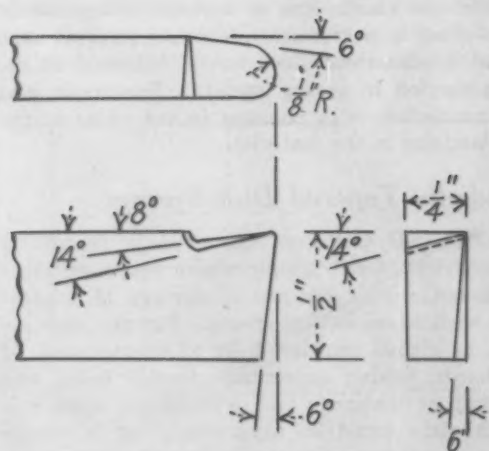


FIG. 3

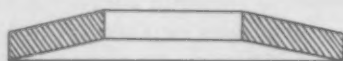
Mechanical-Spring Characteristics

Radially Tapered Disk Springs, Elastic and Inelastic Behavior in Spring Materials and Present Status of the Mechanical-Spring Art

SPRINGS for use in industry were considered somewhat exhaustively at a session of the American Society of Mechanical Engineers, Dec. 3, during the annual convention. Three papers were read and discussed. Much of the material was of a highly technical nature. Such of it as is of general interest is abstracted in the paragraphs below.

Radially tapered disk springs were taken up in a paper by W. A. Brecht and A. M. Wahl of the Westinghouse Electric & Mfg. Co., East Pittsburgh. They showed the advantages of disk springs, both flat and dished, having radially tapered cross-sections. Equations were given for calculating both the strength and the flexibility of these springs. Results of tests, including both strain measurements and deflection, showed the closeness with which practice follows the theory.

Present status of the mechanical-spring art forms the subject of a comprehensive paper by Joseph Kaye Wood, consulting engineer, New York. He traced the principal developments in this country and abroad during the past



Section of Belleville Dished Disk Spring

five years and made suggestions for additional research on points not yet fully established. The paper includes results of the author's continued work on a simplified code of design for mechanical springs.

Elastic and inelastic behavior in spring materials forms the subject of a progress report of the special research committee on mechanical springs. This was presented by M. F. Sayre, supervisory member in charge of research and associate professor of mechanical engineering at Union College, Schenectady, N. Y. He discussed tension tests made on spring metals and called attention to the fact that the elastic line of a metal is apparently curved. This effect is not noticeable at low stresses such as are carried in structural steel, but is observed at the high stresses carried in spring metals. Hysteresis was discussed in connection with changes in the value of the modulus of elasticity in the material.

Radially Tapered Disk Springs

IN ENGINEERING problems the need is frequently felt for a "frictionless" spring where space or other limitations do not permit the use of springs of conventional design, such as the helical spring. For one such application, flat or dished circular disks of spring steel, of uniform thickness, having concentric circular holes, and loaded uniformly at the inner and outer edges, were considered. Such disks could be used singly, or in stacks with suitable spacers to secure the desired flexibility.

In computing deflections and stresses in these disks, an approximate method suggested by Dr. S. Timoshenko was first used. In this method the deformation is con-

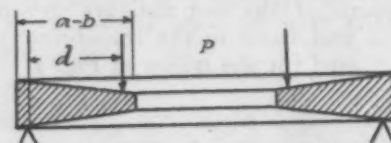
sidered to consist purely of a rotation of the section, cross-bending being neglected. This was found to give results practically identical with those given by the elastic-flat-plate theory.

Advantages of Tapered Section

The advantage of the radially tapered section over a disk of uniform thickness lies in the materially increased flexibility that can be secured where space is limited in the direction of load application. A series or stack of radially tapered disks, such as shown, can often be advantageously substituted for helical springs, especially where loads are high and relatively small deflections are required. In such cases the advantages of the radially tapered disk spring may be summarized as follows:

1. The disk spring is adjustable in height and flexibility by adding or taking off disks.
2. It will withstand lateral loading as well as axial loading.
3. It can be so designed that no disk will be overloaded. Failure of one disk will not cause the complete loss of flexibility, nor will it increase the load on the remaining disks. A failure of one disk would not require replacement of the whole spring.
4. Helical springs of large size are difficult to heat treat uniformly—a disadvantage which can be overcome with the disk spring.
5. Disk springs can be designed to occupy very little space in the direction of load application.

Helical springs are the cheaper to manufacture unless production of the disks is high enough to warrant making



Application of Load on Tapered Disk Spring

forging dies. It may be noted that radially tapered disks have been successfully die forged from 0.90 to 1 per cent carbon spring steel so that no machining was required on the disk faces.

Formulas by Approximate Theory

Formulas have been developed for deflection and stress of radially tapered disks using both the approximate theory and the more exact flat-plate theory. The approximate theory is developed both for flat and dished disks. Since the flexibility decreases rapidly with dishing, the formulas in the paper apply to flat disks of radially tapered section only.

Proportions of Springs for Maximum Flexibility

It has been found that in designing a disk for a given load and a given stress the deflection varies with α , or the ratio of the outer radius a to the inner radius b . The

variation of α also produces a change in the thickness constant k .

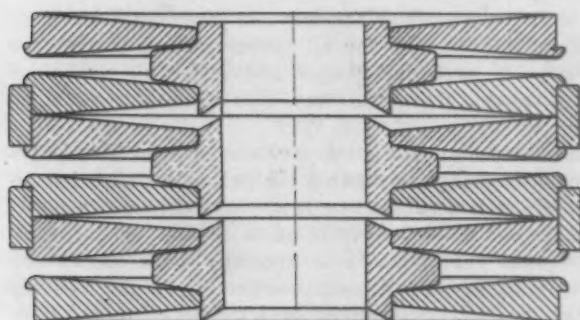
Deflections are a maximum when $\alpha = 2$. It has been found that this maximum always falls somewhere between $\alpha = 1.95$ and $\alpha = 2.05$. This value of α not only gives a maximum deflection, but results in disks of greater lateral stability and of better proportions for forging and heat treating than disks having larger ratios of outer to inner diameter.

Tests on Flat Disk Springs

A series of flat disk springs having various ratios of outer to inner diameter and various values of the thickness constant k were tested. [Test curves were given in the paper, one pair being reproduced here. This pair dealt with springs having outer radius 3.81 in., inner radius 1.5 in., outer thickness 0.267 in. and inner thickness 0.105 in. The springs tested were machined, heat treated and ground.]

Conclusions

Since the stress distribution along a radial section of these disk springs is approximately constant for values of



Stack of Radially Tapered Disks, with Distance Pieces and Keepers

the ratio α of outer to inner diameter less than about 2, it may be said that these springs utilize the material about as efficiently as do transverse elliptic springs (which may be considered as bars under a constant moment). They therefore do not utilize the material quite so efficiently as helical springs; but, on the other hand, have certain advantages over helical springs which may make them preferable for certain applications.

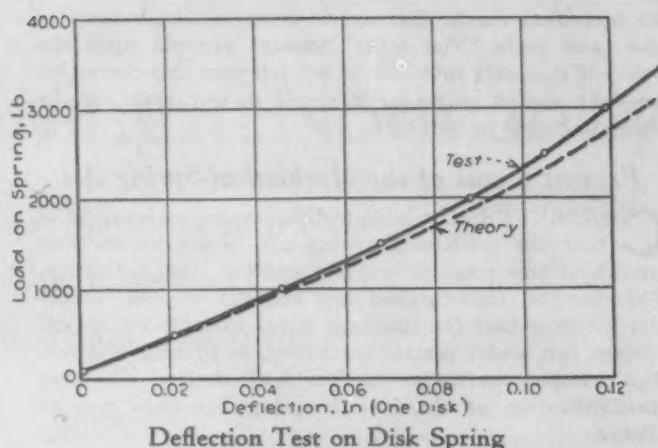
Elastic and Inelastic Behavior in Spring Metals

RESULTS of tests definitely confirm that the modulus of elasticity of a metal is not an absolutely fixed quantity. Overloading in tension beyond the yield point lowers the modulus of elasticity with respect to future lighter loads. Within limits, the greater the permanent elongation, the greater the reduction in modulus. Two weeks' rest at room temperature causes only a slight recovery.

For years Hooke's law, that stress is proportional to strain, has been almost a fixture in engineering practice. Numerical results obtained seem to indicate a second-order correction to this law, not great enough to be perceptible for materials commonly used at low stresses, such as structural steels, but great enough to be noticeable at customary spring stresses in phosphor bronze and spring steel.

Elastic Line Is Curved

With sufficiently accurate measuring instruments, the stress-strain line appears to be continuously curved from zero load upward, not because of minute departures from elastic behavior, but because the elastic line itself is curved. The modulus of elasticity in tension decreases as



the load increases, the decrease in slope of the stress-strain line being of the general order of magnitude of 2 to 4 per cent.

From theoretical reasons it is expected that in compression the modulus will increase as the load increases. Work is planned on the much more difficult problem of checking this phase.

The practical effect of this curvature of the stress-strain line upon the stresses in a power or cantilever spring will be to shift the neutral axis toward the compression side, to decrease slightly the maximum stresses on the tension side, and to increase them on the compression side. The magnitude of the effect will be small.

Hysteresis May Prove Troublesome

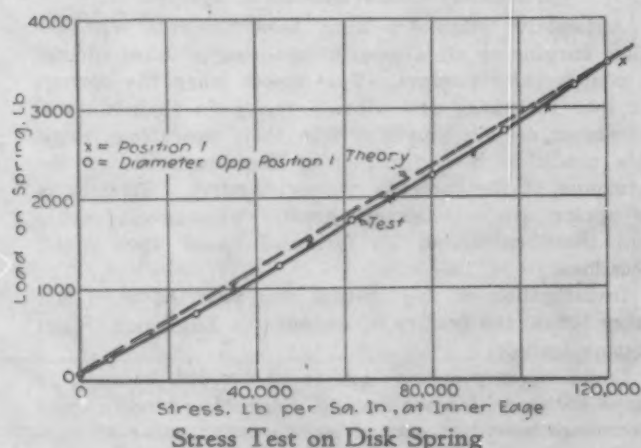
Mention was made last year of a discrepancy in the law of variation of internal friction, or elastic hysteresis, between tension and bending specimens. Later tests have shown that this discrepancy resulted from a sharp break in the law of hysteresis in tension which occurs at about the yield point.

Any overloading, to stresses which exceed 160,000 lb. per sq. in., acts to increase the future energy loss in hysteresis, even for small load ranges. Within limits, the greater the amount of overloading, the greater will be the effect on the hysteresis. Recovery from the effect of the overloading, after two weeks at room temperature, was relatively slight.

The fact that permanent or quasi-permanent changes in both modulus of elasticity and hysteresis begin at about the same unit stress indicates that the two are tied together.

Elongation Effect Negligible

Any permanent elongation of the specimen results in an equivalent decrease of area of cross-section, so that larger elongations would naturally be expected as a result of a given actual load. Any elastic elongation results in



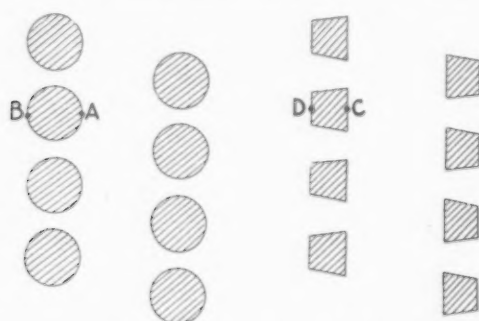
an equivalent elastic decrease in cross-section, but not in the same ratio. The actual amount depends upon the value of Poisson's ratio. It is not felt that this correction properly should be made; it would in any event not be likely to exceed $\frac{1}{4}$ per cent.

Present Status of the Mechanical-Spring Art

CONSENSUS of opinion in this country appears to be that the mechanical-spring art is not known well enough at this stage to warrant general standardization. Experimental investigation has recently yielded conclusive evidence that the standard stress formula for helical springs can, under certain conditions, be greatly in error. This renders partially obsolete and useless whatever standardization of the helical spring has been accomplished.

Helical Springs

Spring specialists have known for years that helical springs with low index (ratio of coil diameter to wire diameter) are actually stressed considerably beyond the



Stresses at Inner Points A and C Are Double Those on Respective Outer Sides, as B and D

point indicated by the standard formula. To some extent this is due to the fact that the vertical shear, which is neglected in deriving the general formula, becomes appreciable when low indexes are used. Thus, the vertical shear in a helical spring with index 3 is 16 per cent of the torsional shear; with index 8, however, it is only 6 per cent of the torsional shear.

This increase in stress was insufficient to account for breakages occurring in service. Hence, it has been considered good design practice to avoid indexes less than 5 and preferably to keep them above 7. Where space limitations or other factors have required low indexes, the best practice has been to calculate with unusually low stress—a considerably larger factor of safety.

Conical springs were discussed by the writer in connection with a new formula which he had derived. With the ratio of minimum to maximum coil radius increasing to unity, the conical spring approaches and becomes a helical spring.

Oscillatory Characteristics of Springs

Automotive engineers have been bothered with so-called surging or vibrational phenomena on valve springs in poppet valve engines. This comes when the springs get into resonance and vibrate freely in their natural periods at certain speeds within their operating range. This condition is a function of the amplitude of the harmonics of the complete valve-lift curve. Stresses in the spring are considerably greater when surge occurs than those calculated by formulas based upon static conditions.

Investigation of this trouble was reported upon last spring before the Society of Automotive Engineers. Conclusions include:

Low-frequency springs are to be avoided, because, at engine speeds within the driving range, they tend to come into resonance when excited by the lower order of har-

monics of the complete valve-lift curve. The lower harmonics usually have appreciable amplitudes.

High-frequency springs are to be desired because, within the same driving range, the resonance points are due to the influence of the higher harmonics, which usually have much less amplitude than the lower harmonics.

Springs with a continuously variable pitch are valuable in minimizing the effects of surge. It is important that a few of the active coils should close up solid when the valve is opened.

Suggestions for Further Work

Several suggestions were made by Mr. Wood as a program for future investigation:

Valve springs—agreement to be reached among outstanding authorities on vibration as to the underlying principles governing the operation of these springs on poppet valve engines.

Helical and conical springs—testing specialists should determine the accuracy of the new deflection formulas for these springs as covered in this paper. This applies also to the special deflection formula derived for springs of variable pitch.

Modulus of elasticity (tensile and torsional)—determination should be made for all spring materials over the full range of sizes and shapes and under all conditions of temperature, heat treatment, cold work and combined stresses.

Continuation of the study of fundamental elastic behavior, particularly as regards the probable slight disruption of Hooke's straight-line law, was recommended. If atomic physicists in cooperation with the spring committee could reproduce in a specially built model the force existing between atoms, then the law of the modulus variation could be determined by test and compared with other observations.

Continuation was recommended of the development of a general code of design on mechanical springs, incorporating all new constants resulting from recent research.

Stresses in Disk and Coil Springs

ONE speaker, in discussing the papers, brought up the question of having disk springs made of rolled material instead of drop forged material, on the theory that this would be more uniform in structure and consequently more reliable in operation. If, then, these springs so made were to be quenched from the inside, it would be possible to transform the residual stress in the material from a hostile stress to one which is friendly. That is, it would provide a stress which in action would partly absorb the operation of the spring.

With regard to coil springs, investigations made by A. M. Wahl of the research laboratory of the Westinghouse Electric & Mfg. Co., East Pittsburgh, have shown that the material is stressed much more heavily on the inside of the coil (A on diagram) than on the outside (B). For any given load the stress on the inside may be as much as 60 per cent above the average for the whole section, while that on the outside is likely to be 40 per cent below the average. Thus, the ratio of inside to outside on springs of circular cross-section, is about $2\frac{1}{2}$ to 1.

When square sections were bent into coil springs, resulting in final form in a section of trapezoidal character, due to the stretching of the fibers on the outside, approximately the same ratio was found between the inside stress at C and the outside stress at D, this ratio running from 2 to $2\frac{1}{2}$. It had been supposed that the considerably greater width on the inside would have resulted in a smaller unit stress at that point compared with the unit stress on the narrower outside surface. This, however, was found not to be the case.

Revival of Iron Mining in Normandy

Ancient French Mining Region Develops into One of the
World's Largest Iron-Ore Reserves, Capable
of Cheap Production and Shipment

BY EDWIN C. ECKEL

FROM the iron trade viewpoint, the most striking result of the World War was the return of German Lorraine to France, thereby bringing under one national control the entire Lorraine ore field. But this change in control did not represent any actual gain to world industry—rather an actual economic loss. It has crippled Germany, which needed the ores and has the coke necessary for their economic utilization; it enriched France to an unnecessary extent, since France must still buy foreign coal to utilize the ores.

Another effect of the war, far less well advertised and probably far more important to the iron trade of the world, is the forced development of the iron field in the Armorican region of northwestern France (the provinces of Normandy, Anjou and Brittany). This is one of the oldest ore fields of the world. The outcrops were worked certainly by the Romans—and probably by the Gauls before them. But their present development, based on a clear knowledge of their geological condition, does not date back much earlier than 1910. Most of the development was forced by the war itself.

Reopening of Ancient Workings

All the older workings were simply shallow open cuts or trenches along the weathered outcrop, 10 to 30 ft.

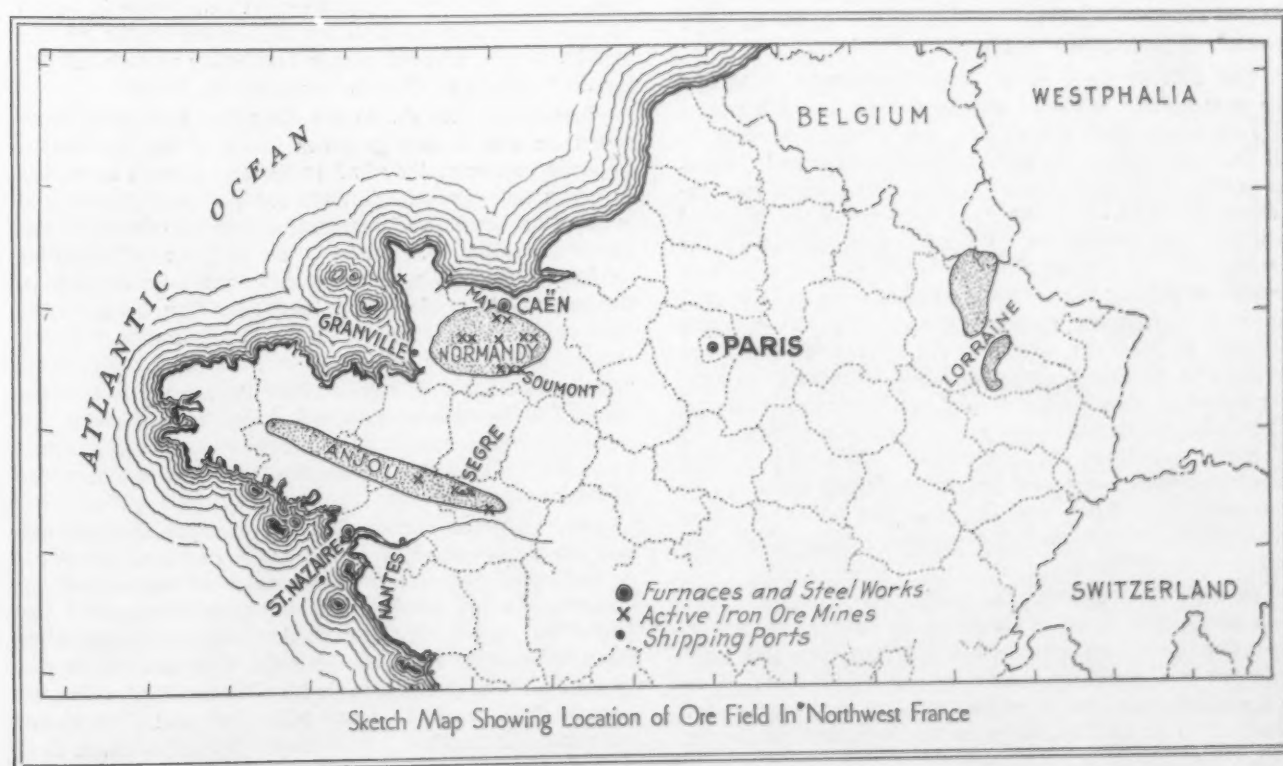
deep and often hundreds of yards long; or else they were equally shallow but broader workings in weathered ore which had become transported some distance from the outcrop and redeposited in small irregular areas. There are literally thousands of these old workings all over north-west France, and in the many centuries they have fed hundreds of small forges, hearths and furnaces.

Today almost all of the active mines are slopes driven in the ore beds to depths which are as yet mostly under 1000 ft., with few exceptions merely fractions of the depths to which workable orebeds are now known to extend. The old open cuts, working on weathered and hydrated brown ore, still furnish a fraction of the total output, serving somewhat as balance wheels; when demand falls off, the open cuts shut down.

In their original unweathered state the Armorican iron ores are hematites and carbonates, altered in some large areas into magnetites. They occur as original sedimentary beds, like the iron ores of Birmingham and Wabana, and, like the latter, they occur in rocks of Ordovician age.

The workable beds average from five to eight feet in thickness; reported thicknesses of 20 ft. are found to include a good deal of slate. Being sedimentary, these ores can be followed down the slope as far as mining is

(Concluded on page 1703)





BOOK REVIEWS



Why Protection for Steel?

The Tariff on Iron and Steel. By Abraham Berglund and Philip G. Wright. 240 pages, 5 x 7½ in. Published by the Institute of Economics of the Brookings Institution, Washington, D. C. Price \$3.

There have been other attempts to tell the truth about iron and steel tariff schedules, but it is to be doubted if any has been so successful as this one. So used are we to politically partisan, sectional or other varieties of prejudice in tariff discussions that the fairness of what these authors have set down seems well-nigh millennial. By none should such a book have a better reading than by members of Congress; but nowhere would this reasoned, informed and unprejudiced putting of the tariff situation in respect to the chief of our manufacturing industries have less weight, judging from the way in which the pending bill has been bedeviled, than with the Congress now sitting at Washington.

Doctor Berglund made a special study of iron and steel when he was with the United States Tariff Commission some years ago, and did a good piece of work in war time and later, on the place of the ferroalloys and their ores in the economy of the steel industry, particularly in their relation to national defense. In the book before us he deals, in the first four chapters, with the various forms of iron and steel, the processes of manufacture, the building up of the industry in the United States, and the position of this country in competition with the steel-producing countries of Europe. With respect to natural resources for the production of iron and steel he shows that the United States leads the world. On the other hand, in respect to natural resources for the production of the ferroalloys (which were the main matter of contention in the making of the metal schedule of the tariff act of 1922, just as they are at Washington today) he finds that the United States is in no such position of unqualified leadership.

The authors have shown due discernment in sifting the propaganda material on manganese and other ores of ferroalloys that for so long has been doing duty in all the committee-room discussions of House and Senate. As might have been expected, they were much less impressed by much of it than were members of the sectional coalition who finally wrote the manganese section of the Senate bill. In dealing with the interests that were successful in getting the ferroalloy paragraphs of the tariff act of 1922 to their liking, they show that the pressure brought to bear on Congress for increased duties on ferroalloys and their ores was much stronger than that for increased duties on iron and steel tonnage products. They also bring out clearly the coalition between the Western producers of manganese, molybdenum and tungsten-bearing ores and the "agricultural bloc," which succeeded in writing into the bill high rates on these minerals which were mainly consumed by manufacturing concerns in the East.

In their final chapter the authors present their conclusions in the form of answers to several questions, including these: To what extent has the iron and steel industry prospered by reason of the tariff? Are iron and steel duties a burden on industrial or final consumers? What is to be said of these duties from the standpoint

of public policy? In brief, the answers come to about this:

1. While the tariff was formerly helpful in placing the iron and steel industry on a solid foundation, now, so far as tonnage products are concerned, it has served its purpose. The industry is able to meet foreign competition on even terms without artificial aid. Except, perhaps, in the case of certain seaboard furnaces, the duties are nominal. They do not appreciably benefit the industry nor burden consumers. Their removal would cause little or no disturbance.
2. The duties on alloy ores are a burden to the industry as a whole and to final consumers. There is no prospect that these duties will develop strong industries. Public policy would seem to indicate their repeal.
3. On the other hand, duties on high grade carbon steel and on the ferroalloys have developed strong domestic industries. So long as protection remains the dominant note in our tariff policy, moderate duties, sufficient to maintain the more efficient domestic producers, have much to commend them.

There will be dissent from the view expressed in the first of the above three paragraphs, that the very moderate duties now imposed on tonnage iron and steel products may be dispensed with. The authors admit that the placing of all tonnage products on the free list "might compel certain branches of it located near the seaboard either to go out of business" [as though that were inconsequential] "or adopt more effective methods." The fact is that the methods of our seaboard works on both coasts are highly effective, yet there is a steady, even though not large, seepage of foreign finished material through seaboard ports. As has been suggested in these columns in previous discussions of this subject, the moderate steel prices prevailing in this market give our manufacturers a considerably smaller rate of profit than is enjoyed by most of our manufacturers who are buyers of steel. With one-sixteenth of the world's population, the United States produces one-half of the world's steel. The producers of the other half may well be satisfied to sell their steel to the fifteen-sixteenths of the world's people, without asking free entry to this market for the products of their low-wage labor.

Concerning the duties on tungsten and manganese ores it is stated that in order to be of any service to domestic producers they had to be high enough to double or treble the price of the imported product. Meanwhile imports, in the case of manganese ore, are six times the domestic production. Conservation of the small supplies we have is urged, against a need that may develop in the future. "The duties on these ores can be defended only on the theory that it is the Government's duty to cherish all its 'war babies' at any national cost. If it is felt that the men who risked their capital in these enterprises in time of national stress have a claim for consideration, it would be far better economy to reimburse them for their investment—buy them out once for all and have done with it."

Several appendices to the book deal with assembling and production costs of various iron and steel products in the United States and the countries of Europe. Some of the data are taken from two articles prepared for THE IRON AGE in 1927 by Paul M. Tyler, formerly on the staff of the Tariff Commission and later with the Bureau of Mines, on dealing with "Transportation Handicaps in Steel" and the other with "Ore and Fuel Costs, Here and Abroad."

A. I. F.

Reducing Management to Formula

Production Planning—Its Engineering Elements. By John W. Hallock. 172 pages, 6 x 8½ in., 64 figures, 3 tables. Ronald Press Co., New York. Price \$4.

This volume, by the head of the industrial engineering department of the University of Pittsburgh, is intended to serve both as a textbook in engineering colleges and as an organized reference for manufacturing executives. The organization and direction of production is regarded as a technical engineering subject, and in this book is given the scientific and mathematical treatment universally adopted in dealing with problems of engineering design. The author aims to show how to use mathematical relationship and computations in answering practical questions and solving every-day production problems. Application of the principles and methods of planning are illustrated in connection with the manufacture of globe and gate valves.

From an outline of the function of planning, in which it is recognized that not all plants require the same refinements of planning and production control, the author passes to methods of estimating the time required to perform any given operation in the foundry and machine shop. Relation between power and the amount of metal removed (or machine analysis) includes lathes, milling machines and drill presses; computation of process time is conveniently done by the straight line or alignment chart. Economies in the use of jigs and fixtures is discussed and includes the formulas of Prof. Joseph W. Roe. A chapter on materials handling in controlled production includes the general formulas presented in 1925 by the materials handling division to the American Society of Mechanical Engineers.

R. E. M.

Cost Accounting, American and German

Manufacturing Costs and Accounts. By A. Hamilton Church. 516 pages, 6¼ x 9¼ in., illustrated. McGraw-Hill Book Co., Inc., New York. Price \$6.

This treatise on cost accounting is intended primarily for the student of accounting, but it seems evident that to receive the full measure of benefit the reader should have a good knowledge of accounting fundamentals, general methods and economics.

While the specific illustrations are based on the fabrication and assembly of finished products in a metal-working shop, the principles laid down and the methods described are applicable to general manufacturing and assembly. The approach and discussion throughout are analytical. The principle that all expenditure that does not contribute in some definite way to the alteration of the status or condition of material is wasted expenditure, is consistently carried in the mind of the author.

The author defines three principal types or methods:

Method A. Direct labor and expense are merged and averaged and charged to each unit of production on a time basis.

Method B. Direct labor is charged to unit quantity on a time basis, while expense is averaged and charged as a percentage on direct wages.

Method C. Direct labor is charged to unit quantity, and expense is similarly charged by means of a machine rate, both on a time basis.

In analyzing the three methods, diagrams, forms and specific examples are given with clearness and painstaking care. Diagrams are somewhat unusual. Emphasis is laid on "work in progress" and its effect on exact costs. The author here indicates that the value of intricate detail is very high to those responsible for manufacturing operations.

In summarizing the results, the author points out that

the series of forms set up serve as abstracts of the various transactions treated. The principle is enunciated that all accounting is based on the difference between ownership and property.

To apply these methods to any industry a good grasp of the way in which values are analyzed and combined is necessary. Besides the actual materials bought, stored, accounted for and charged, depreciation, service (such as rent, taxes and insurance), labor and other expense, must be given due weight by a proper mechanism of assembly.

Part III relates to factory returns. Briefly, these are for three sets of officials in a factory, viz:—the foremen, the superintendents and the executives. For the foremen the reports should be prepared by the accountant in detail and each day, for the superintendents, there should be less detail and more comparison; for the executives, even more general and less frequent, consisting, in a word, of the financial results in brief.

T. W. BUXTON.

Russia Makes a New Start

The Soviet Union Looks Ahead. The Five-Year Plan for Economic Construction. 275 pages, 5½ x 7¾ in., with 2 colored maps and 13 charts included in text. Horace Liveright, New York. Price \$2.50.

Industrial and agricultural expansion to the extent of \$32,300,000,000 in the brief period of five years is so ambitious as to stir our admiration, even though possibility of complete realization appears decidedly remote. Yet such a plan was adopted last May by the 3000 members of the Congress of Soviets, representing more than 180 nationalities.

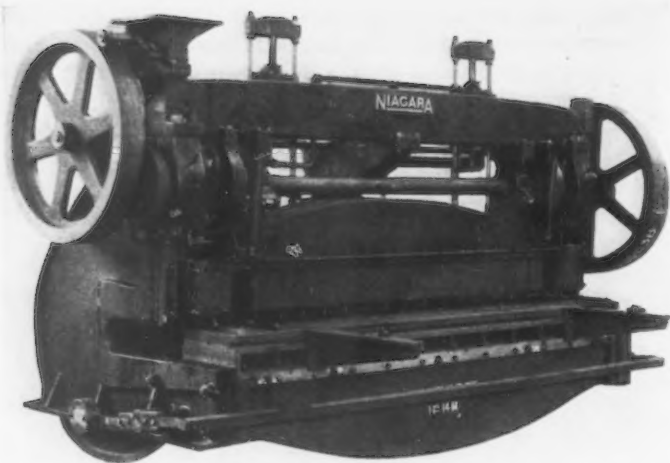
To quote the English version of the five-year plan, "the object must be, with the aid of the colossal natural resources of the Soviet Union, the advantages afforded by its system of an organized and planned national economy and the latest technical achievements, to secure a rate of economic development higher than that yet attained by modern capitalist countries."

Some hint of the problems faced by the Soviet Union with an obstinate peasantry not yet convinced of the advantage of communistic enterprise appears in the distribution of the planned expenditure; half of the 64,600,000,000 rubles will be devoted to agriculture by aiding cooperatives, furnishing tractors and other mechanical equipment and establishing state owned farms, so that by the end of the period the Government will occupy a more important agricultural position than at present. It is planned to have 75 per cent of the agricultural output in 1933 from private farms and 25 per cent from Government and cooperatives of the smaller peasants.

The remainder of the total expenditure is to be distributed to industry and housing, 20,300,000,000 rubles (a ruble is about 50c.); electrification (not including industrial power plants), 31,100,000,000; and transportation, 10,000,000,000.

The problem of obtaining an adequate force of engineers, technically trained workers and generally skilled workmen is acknowledged as the most difficult of solution. It is frankly admitted that the "principal defect in the long-term planning thus far done in the Soviet Union was the failure to give due attention to this problem of personnel, and to assign to it a proper place among the primary requisites." To execute this ambitious program 24,200 additional engineers will be needed by the end of the period in all departments, while the existing higher technical institutions as they now function can supply only about 20,000 for all fields, including transportation, commerce and teaching. It is consequently proposed to provide intensive instruction in certain special fields in-

(Continued on page 1706)



The Main Eccentric Shaft of This Squaring Shear Is an Accurately Ground Forging. The eccentrics are forged solid with the shaft

Improved Heavy-Duty Power Squaring Shear

IMPROVED series M heavy-duty mill squaring shears, which range in capacity from $\frac{1}{2}$ in. to $\frac{3}{4}$ in., mild steel plate, and in length from 60 in. to 192 in., have been announced by the Niagara Machine & Tool Works, Buffalo.

The main eccentric shaft is a large diameter steel forging accurately ground, with the eccentrics forged solid with the shaft. The main bearings in the housings and the rigid center bearings lie immediately adjacent on either side of the eccentrics and holddown cams, an arrangement intended to eliminate vibration, resists deflection and minimize bending stress. The two end bearings are solid sleeves fitted into the housings and may be removed conveniently when worn. The company's patented individual spring foot holddown employed is operated by two cams located on the main shaft. Cam rollers

are of hardened steel and run in oil. Toggle links transmit the holddown pressure directly to the housings, relieving the cams, mainshaft and main shaft bearings. Each foot has an individual spring cushion, making it self adjusting for short and long plates of different thicknesses.

The massive crosshead carrying the upper knife is of deep box section. It is counterbalanced by means of two pneumatic cylinders mounted on the crown, but provision is made for counterbalancing by springs or weights if air is not available. The lower knife chuck, of box construction, is adjustable from front to back for the setting of the knives. A large positive jaw clutch with three engaging surfaces controls the motion of the crosshead. All machines of the M series are double geared, the gears having cut teeth. Either belt or geared motor drive may be applied.

Combination Disk and Production Grinder

WHEN disk grinding operations are limited, the solid wheel of the combination grinder illustrated can be used for grinding tools and



castings. The machine is a recent addition to the line of the Hammond Machinery Builders, Inc., Kalamazoo, Mich., and is built in four sizes, 2, 3, 5 and $7\frac{1}{2}$ -hp. capacity, for 220 and 440-volt, 25 to 60-cycles alternating current, and 110 and 220-volt direct current. Standard equipment includes a steel adjustable wheel guard, steel disk, and plain table, although a universal lever-feed table can be furnished if desired. The machines can also be fitted with disk on both ends, with either the plain or universal lever-feed tables.

The motor is entirely inclosed and is fitted with an air cleaner (patent applied for) which supplies clean air to the windings. The machines are equipped with push button control and automatic motor starter, having thermal overload protection, low voltage, and phase failure protection. The automatic starter, mounted on the inside of the pedestal door is accessible for inspection and reset-

ting. Ball bearings designed to take both radial and lateral thrust are used; they are completely inclosed and protected from dust and grit by double labyrinth seals. Oil reservoirs are provided with convenient oil cups, oil level gage and drain plug for ease of flushing the bearing chamber. The oil chamber is designed so that surplus oil will run out through overflow located at the wheel end of the bearing compartment, away from the motor windings.

The disks are machined on both sides so that two disk wheels can be mounted at one time. After one is worn, the disk can be reversed. Wheel presses for mounting disks can be supplied to order.

Bench Vise Designed to Hold Irregular Shapes

BENCH-TYPE Berjo vises in both plain and swivel-base models are being manufactured by the Avey Drilling Machine Co., Cincinnati. As indicated in the description of the machine vise in *THE IRON AGE* of Jan. 10, Berjo vises have multiple



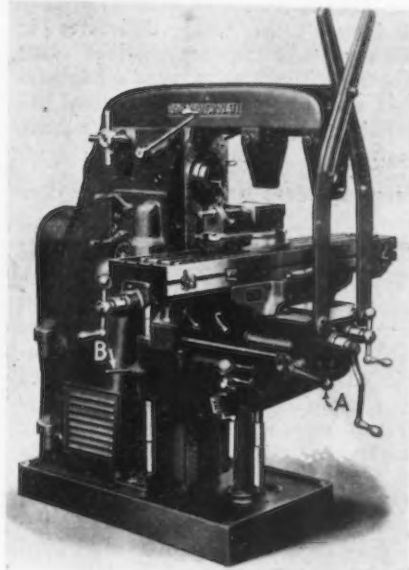
compensating jaws which hold both regular and irregular shaped pieces securely. The jaws are backed by an arrangement of steel balls which flow much the same as a fluid and allow the jaws to follow the contour of the work. The lever at the side is for bringing the compensating jaws into parallel alignment in which position they can be locked. The weight of the plain bench vise is 84 lb. and of the swivel vise 96 lb. The opening is 4 x 7 x 3 in.

Automobile Executives Are Le Blond's Guests

More than 30 executives of automobile factories were guests of the R. K. Le Blond Machine Tool Co., Cincinnati, Dec. 10 and 11, at a special showing of the latest models of Le Blond crankshaft lathes in operation. On Tuesday evening, Dec. 10, the visiting executives were dinner guests of the Le Blond company at the Alms Hotel. W. F. Groene, vice-president, spoke on "The Story of the Crankshaft," tracing the history and development of the crankshaft and the evolution of equipment for manufacturing it.

Millers Equipped with Power Quick Traverse

POWER quick traverse up and down, in and out, left and right, are now provided on the M-type milling machines, Nos. 1 and 2 plain, universal and vertical styles, manu-



factured by the Cincinnati Milling Machine Co., Cincinnati. The rates are 100 in. longitudinal, 66 in. cross and 33 in. vertical.

The power quick traverse lever A, which is conveniently located at the left front side of the knee, has three positions: Upward, for power quick traverse; horizontal, for neutral; and downward, for feed. To obtain power quick traverse in a given direction it is only necessary to engage the respective feed lever, move the reversing lever into position and then pull upward on the power quick traverse lever.

Feed in the same direction as the power quick traverse is obtained by moving the lever A into the downward or feed position. A detent is provided for holding it into position. Twelve feeds are available; that is, $\frac{3}{4}$ to 30 in. longitudinal, $\frac{1}{2}$ to 20 in. cross and $\frac{1}{4}$ to 10 in. vertical, in both directions. Rear control of any one of the three feeds can also be obtained by the use of the rear reversing lever B, a duplication of the lever at the front of the feed box.

Pneumatic Wrench to Take Off Staybolt Caps

THE Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, has brought out a new pneumatic wrench, designated as the Thor No. 278, which operates at 170 r.p.m. The speed is governor controlled. Heavy-duty ball bearings are used at



vital points, and a renewable rotor liner is provided to save cylinder wear and reduce upkeep costs.

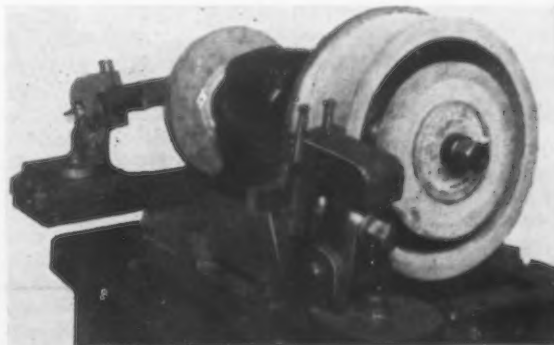
It is claimed that in one shop using this machine the 600 to 750 flexible staybolt caps usually used on locomotives are removed in 6 hr. with only one boiler maker and a helper. Previously, removing these caps by hand required two boilermakers and two helpers working 8 hr. The wrench can be used for removing rusted staybolt caps, and because of its fast starting torque it will break nuts loose from cylinder studs without backing the stud out. Dome nuts, superheater units and frame bolts are also handled rapidly. The tool weighs 40 lb.

Grinds and Laps Tungsten-Carbide Tools

TUNGSTEN-CARBIDE tools may be rough and finish ground and lapped in one set-up in the vise of the combination grinding and lapping machine illustrated, which has been brought out by the Advance Diamond Tool Co., 427 West Congress Street, Detroit.

At one end of the machine there are two rim wheels, one of which is a 12-in. 60-I grit roughing wheel and the other an 8-in. 120-I grit finishing wheel, while at the opposite end there is a diamond lapping disk. Both ends of the machine are provided with a slide that extends across the face of the wheels, and there is another slide which moves toward the face of the wheel. The latter carries a special universal vise.

The tool to be ground is put in the universal vise, and the angles are

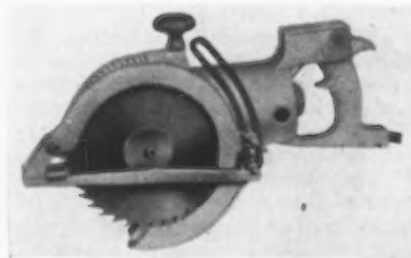


adjusted to requirements. Grinding is accomplished by operating the slide across the face of the rim-type roughing wheel, and then across the finishing wheel. If diamond lapping is to be performed on the same tool the cross slide and universal vise with tool mounted thereon are removed and placed on the slide at the lapping end of the machine. The tool is then moved up against the lapping disk and finish lapped. The tool remains

set up to the proper angle throughout the entire grinding and lapping operation. An electric rheostat permits varying the grinding speed to compensate for variations in the hardness of the emery wheels employed. This feature is important in grinding tungsten-carbide tools for the reason that unless the speed is correct, either the wheel does not cut at all or the tool wears the emery wheel away. The machine is said to prove economical in manufacturing plants using as few as a dozen tungsten-carbide tools.

Light Weight Electric Saw

A PORTABLE electric hand-saw weighing 15 lb., for use in shipping departments, plant maintenance and other work, has been added to the



line of the Wodack Tool Corporation, 4627 West Huron Street, Chicago.

This machine, named the Junior model K, is designed for cutting boards up to 2 $\frac{1}{2}$ -in. thick. It is compact and has a saw-dust blower that facilitates sawing to a line, a convenient trigger switch, momentary contact, rip gage to save marking the board to be sawed, and a depth gage

THE Wheels in the Foreground Are for Rough and Finish Grinding of the Tungsten-Carbide Tools. The tool remains set up at the proper angle throughout the grinding and lapping operations.

that is adjusted by one wing nut. Accessories include extension cord, lubricant, grease gun, and a steel carrying case.

An exhibit of silent chain drive in many phases of industrial application will be shown by the Morse Chain Co., Ithaca, N. Y., at the Road Show in Atlantic City, N. J., Jan. 11 to 17. This is substantially the same exhibit as was shown during the Power Show in New York early in December. Flexible couplings, single, double and triple-reduction speed reducers and ring and disk oilers will be featured, as well as the silent chain.

Committee Named to Stabilize Business

Business Leaders Appointed by Julius Barnes, Who Says Reports Indicate No Cause for Timidity

WASHINGTON, Dec. 17.—Courses of action looking to continued stabilization of business probably will be recommended at the first meeting of the 21 members of the executive committee whose appointment was authorized at the National Business Survey Conference held here at the Chamber of Commerce of the United States on Dec. 5. Julius Barnes, who announced the committee, will, as requested by the conference, act as its chairman. The committee is made up of prominent business leaders throughout the country. The steel industry is represented by Myron Taylor, chairman of the finance committee, United States Steel Corporation.

The conference also authorized the appointment of a larger general committee, to be named later. This committee will be broadly representative of the many lines of business enterprise and may consist of as many as 50 men, according to an announcement of the chamber. The individual members of the larger committee will serve as points of contact between the executive committee and trade associations and commercial groups.

Mr. Barnes said that the executive committee will be called into consultation at an early date but that nothing of an emergency character exists in the present business situation to require undue haste in its work. This committee will go over the reports submitted at the conference as well as other material which is being gathered on the business situation, and from these analyses it is expected to recommend a program to be followed for maintenance of business activity and employment.

No Cause for Timidity

Mr. Barnes said that a preliminary study of the many reports submitted to the conference indicates that there is nothing to cause further timidity or hesitation. On the contrary, these reports, he said, warrant confidence in the early stabilization of business activity.

He said that provisions for study and comparison of conditions in the various industries through representative trade organizations is being made by the formation of a large committee comprising competent and recognized leadership in the more important business fields.

The executive committee was made small in number, it was stated, so that it can meet more frequently and act with greater dispatch in shaping and directing major policies. In selecting the executive committee, Mr. Barnes said, it was necessary to choose from a wealth of proved leadership, ability and character. It was recognized that it was impossible to include many outstanding men of tried experience and judgment or to include representatives of every line

of business, many of which are of great importance. Geographical distribution was taken into account in choosing the smaller committee, Mr. Barnes explained, but greater weight was given to breadth of experience.

The membership of the executive committee follows: Julius Barnes, chairman, board of directors, Chamber of Commerce of the United States, chairman; Owen D. Young, chairman of the board, General Electric Co. and Radio Corporation of America, New York; Myron C. Taylor, chairman of the finance committee, United States Steel Corporation, New York; Thomas W. Lamont, partner, J. P. Morgan & Co., New York; Paul Shoup, president, Southern Pacific Co., San Francisco; Clarence M. Woolley, chairman of the board, American Radiator & Standard Sanitary Corporation, New York; Henry M. Robinson, president, Los Angeles-First National Trust and Savings Bank, Los Angeles; Walter C. Teagle, president, Standard Oil Co. of New Jersey, New York; James Simpson, president, Marshall Field & Co., Chicago; Cornelius F. Kelley, president, Anaconda Copper Mining Co., New York; Elbert L. Carpenter, president, National Lumber Manufacturers' Association, Minneapolis; Pierre S. duPont, chairman of the board, E. I. duPont de Nemours & Co., Wilmington, Del.; Lewis E. Pierson, chairman of the board, Irving Trust Co., New York; George Horace Lorimer, editor, *Saturday Evening Post*, Philadelphia; Walter S. Gifford, president, American Telephone & Telegraph Co. New York; Alvan Macauley, president, National Automobile Chamber of Commerce, Detroit; John G. Lonsdale, president, American Bankers Association, St. Louis; Stuart W. Cramer, director, Cotton Textile Institute, Cramerton, N. C.; Charles Cheney, president, National Industrial Conference Board, Manchester, Conn.; Silas H. Strawn, chairman of the board Montgomery Ward & Co., Chicago; Harry Chandler, publisher, *Los Angeles Times*, Los Angeles.

Machine Tool Trade Hopeful

The chamber has prepared summaries of reports submitted to the conference and distributed them in booklet form.

The report for the machine tool industry was filed with the chamber by E. F. DuBrul, Cincinnati, general manager, National Machine Tool Builders' Association, who pointed out that the first 10 months of 1929 produced about one-third more business than was booked in the first 10 months of 1928. During all of 1928 the orders were on the upgrade, the report said, but in 1929 orders have been on the downgrade since May,

which was the peak month for the present movement.

"It seems reasonable to expect that 1930 should turn in between 20 and 25 per cent less orders for machine tools than were booked in 1929," it was declared. "This would be only a little below 1928, which was a good, comfortable year for the industry. Since we had to run overtime and even double-shift to make deliveries in 1929, we feel that we shall be quite comfortably off on a year's business that would be only 75 per cent of the volume of such a boom as we have been in."

Crane Builders Expect Good Business

Reporting for the electric crane industry, President W. D. Sayle of the Electric Overhead Crane Institute said:

"We are just completing a most satisfactory business year, as is indicated by the fact that the shipments of electric overhead cranes for the first 10 months of 1929 exceeded the shipments for the same period of 1928 by over 68 per cent. The orders received for cranes during the first 10 months of 1929 exceeded those received during the same period of 1928 by over 97 per cent and exceeded the orders for the entire year of 1928 by 65 per cent.

"It is quite evident from the foregoing that the balance of orders at this time, and of which there is not the slightest evidence of cancellation, will provide a volume of business for the year 1930 fully equal to that of 1929, even should there be a slight falling off in the volume of new orders during the early part of the year 1930.

"It was the consensus of the industry that, while there might be a moderate cessation in the placing of new orders for cranes, there would be a quick recovery from such depression, if it occurred, and that the total volume of new crane business placed in 1930 would undoubtedly be fully equal to that of 1929."

Look for Upturn by March

The condition and prospects of the woodworking machinery industry were stated in a report filed by L. P. Monks, president, Association of Manufacturers of Wood Working Machinery. It was pointed out that during the closing period of 1928 the industry was on an upward curve and that the closing of 1929 shows it to be on a downward curve. The report said that the industry scarcely expects to note a decided improvement before March, 1930, although it is "quite confident that we shall swing into an upturn by that time."

The present situation in the forging industry was declared to be slightly off from this time last year, said a report filed on behalf of that industry by G. H. Weiler, New York. Prospects for the next six months, as compared with a corresponding period this year, it was added, are nearly equal. The report represented about 85 per cent of the industry.

Is Business Taking Course of 11 Years Ago?

Then, as Now, Output of Basic Materials Fell Off More Than Retail Trade—Post-Armistice Curtailment of Consumer Buying Failed to Materialize

BY DR. CHARLES O. HARDY

THE outlook for business in 1930 is but little clearer than it was a month ago. The recession of business activity which was in evidence before the stock market collapse is proving to be very irregular in its incidence, some lines of activity falling off with amazing rapidity while others show little sign of slackening. It is quite remarkable, for instance, that steel production has shown the most rapid decline on record, while coal production has not fallen below normal; cotton consumption has been extremely slow, while chain store and mail order sales continue their rapid rate of growth. The situation is confusing.

The favorable factors may be summarized as an unexpected strength in retail trade, a farm situation distinctly better than in most recent years, an ample supply of credit, moderate inventories and, finally, a well-organized movement headed aggressively by the President of the United States to stabilize the business situation by stimulating those lines of activity where output need not be adjusted to temporary fluctuations in demand.

The outstanding unfavorable factors are a widespread undercurrent of pessimism, engendered by the stock market collapse, and the accumulation of evidence that the actual rate of operation in several basic lines has been falling off with a rapidity which reminds one of the behavior of the stock market itself.

Of the two unfavorable factors mentioned the psychological situation is the more difficult of description. Naturally the optimists are more outspoken and receive greater publicity than do the pessimists; nevertheless there is an undercurrent of gloom which is not dissipated by the expressions of confidence that have emanated so generally from public officials, business and financial leaders and business forecasters.

Basic Production Shows Sharp Drop

THESE apprehensions were confirmed by the reports of basic production for November. The worst report was from steel—a drop in the daily rate of production, from October to November, of 19 per cent, the largest on record. Moreover, this was the sixth successive month which showed a decline. Pig iron output also, of course, fell off sharply, though the reduction was not so

great and the November rate was higher than that in any month in the last half of 1927.

The report of unfilled orders of the United States Steel Corporation, on the other hand, showed an increase for the third successive month. This showing was due to the fact that pro-

Public works and utility programs have previously expanded in slack times.

* * *

Now central organization and planning will reinforce stimulus of savings in cost.

* * *

Present juncture recalls business situation after Armistice. The stock market declined sharply in November, 1918, commodity prices turned downward, industrial activity slackened.

* * *

Then, as now, the center of depression was in parts of the industrial organism furthest from the ultimate consumer. But the buying power of consumers was underestimated.

duction was cut in November to 75 per cent of capacity as compared with 85 per cent in the preceding month, while bookings fell only to 78 per cent of capacity as compared with 98 per cent in October. In spite of the substantial backlog of unfilled orders the Steel Corporation's rate of activity has continued to decline, and was reported at 65 per cent on Dec. 14.

Cotton consumption in November was off 18 per cent from October and 14 per cent from November of last year. Stocks of copper and of raw silk are reported as heavy and increasing, and prices of raw materials generally have been falling except in cases where producers are so well organized that they can hold up prices in the face of slack demand.

Retail Trade Is Sustained

Wholesale trade is generally reported as bad. On the other hand, the slump in retail buying which was feared as the immediate result of the

stock market collapse has failed to materialize. Sales of 26 leading chain store companies for November (including those of the two leading mail order houses) showed a gain of 15 per cent over last year. Nor does this mean merely that buyers have turned from the higher priced stores as a forced measure of economy. Reports of department stores and other retailers to the various Federal Reserve banks are generally good; it appears now that Christmas trade will be very satisfactory. Sales of radios, automobiles and a few other "luxury" lines show up badly; it is uncertain how far that reflects over-selling during the past year and how far it is a result of speculative losses.

The most interesting development of the month is the series of conferences called by the President to encourage the carrying forward of construction activities. It has often been suggested that the most hopeful way to deal with business depressions is through organized effort to concentrate in such periods the building of roads and school houses, the improvement of rivers and harbors and other public works, together with railroad and public utility construction and such industrial expansion as does not depend for its justification upon the immediate state of the market. On the other hand, so the theory runs, in periods of high industrial and commercial activity a sound policy calls for the curtailment of construction of the types just indicated. Such a plan has the double advantage that it would result in an economy of construction and financial cost and would tend to equalize the volume of employment and the disbursement of purchasing power.

Stabilizing Influence of Public Works in Previous Years

TO a certain extent the plan has been carried out heretofore, public works and public utility operations tending to expand in slack times and giving way to industry when the pressure is great. Thus railroad, public utility and State and local borrowings were nearly twice as great in 1921 as in 1919; their combined total was larger in the dull year 1924 than in either 1923 or 1925. To carry out the idea effectively, however, requires central organization and planning, in addition to the stimulus of an uncertain saving in cost.

The notion that the Federal Gov-

ernment can play an important role in bringing about such a balancing of economic activity is relatively new in practical politics, and is one of President Hoover's titles to recognition as a political-economic statesman. In the spring of 1923, as Secretary of Commerce, he warned the public that there were indications of an over-expansion of business activity and suggested a deferment of public construction expenditures. The writer has always believed that this action counted for more in checking business expansion at that time than did the small increases in discount rates which are generally believed to have done it. Under Mr. Hoover's administration the Department of Commerce devoted its energies to encouraging the accumulation and publication of statistical data which may make possible a better adjustment of individual programs to the general situation. Now, for the first time, he has an opportunity to test the possibilities of cooperative effort with Governmental leadership to shorten the downswing of business through a concerted concentration of effort.

Present Recalls Situation After Armistice

THE business situation at the close of 1929 suggests comparison with that of 1918. Then, as now, the economic organization of the country had received a terrific shock. Then the business world anticipated that the release of millions of men from military duty would at the same time create a vast burden of unemployment relief and make possible an output of commodities which would play havoc with the price level. War demand was about to cease, and vast industrial organizations would lose their only market. The stock market declined sharply in November; commodity prices turned downward, industrial activity slackened—all the familiar phenomena of the early stages of depression appeared. Agencies of the Federal Government called conferences of business men to plan how to avoid depression—in that case through agreements to stabilize prices rather than through efforts to increase production.

Then, as now, however, the center of depression was in the parts of the industrial organism that are farthest from the ultimate consumer. Production of basic raw materials fell off more than that of goods for consumption, and wholesale trade more than retail. Raw material prices fell most, the cost of living least. Curtailment of consumption was apprehended, and to get ready for it producers curtailed operations. The result, since consumers' buying slackened but little, was to use up stocks all along the line.

Consumers' Buying Power Was Underestimated

IN the course of a few months it became evident that business leaders had failed to take account of the enormous buying power which the farm population had accumulated

through several years of prosperity, of the European demand that credit operations could change into actual buying, and of the demand that the return of the military forces would bring into the markets for civilian clothes, for housing facilities, and so on. Consequently the depression was very short-lived. Inventories were sold out; then industry set itself with renewed energy to building them up

Favorable Factors

1. Unexpected strength of retail trade.
2. Improved farm situation.
3. Ample supply of credit.
4. Moderate inventories.
5. President's stabilization program.

Unfavorable Factors

1. Undercurrent of pessimism.
2. Sharp drop in activity of basic lines, such as steel and cotton.

again—and this time caution was forgotten.

The details differ, but basically the present situation is very similar. Again a few industries really do face the probable necessity for adjustment to a market inadequate to utilize their capacity, but both rural and urban population have a purchasing power substantially unimpaired. Curtailment of businessmen's buying from one another has started in response to a consumers' market situation which is apprehended but not seen.

If we are right in believing that the high level of productive activity of the last two years has been only proportionate to the expansion of consumption and has not resulted in the general piling up of inventories of manufactured goods, and if the curtailment of business activity does not quickly run so far as to undermine its own market through curtailment of its wage payments, the most probable outcome is, as in 1919, an early realization that "the business situation is fundamentally sound." To the achievement of this end no better program than that now being fostered by the Federal Government and the United States Chamber of Commerce and other agencies could be suggested.

Two Risks in President's Program

TWO risks suggest themselves, however. First, it is not a sound long-run policy to meet threatened unemployment of labor by creating unemployment of productive capacity. If the construction program of 1930 is wisely planned it will at the same time relieve immediate fears of unemployment and bad trade and provide the ultimate basis for further expansion of both the production and consumption of the country. If, on the

other hand, resources are turned into the production of types of building with which we are already supplied, of ships which can get business only by crowding other ships off the seas, into the digging of waterways to take care of non-existent traffic, immediate relief will only defer business difficulties. Second, and more serious, there is danger that if the present downswing of business shall be as temporary and as mild as those of 1919 and 1927 we may, as in 1919, sow the seeds of a worse harvest to follow. One of our most valuable business assets is the spirit of caution which the business world acquired in 1921. Commodity markets can run wild as easily as can stock markets. Too hasty an acceptance of the idea that we have mastered the technique of controlling business cycles may destroy the possibility of such control.

Recommend Some Welding in New York Buildings

Technical committees which are assisting in the work of revising the building code of New York City have made recommendations to the Merchants' Association of New York, which, at the request of Mayor Walker, has undertaken the work of obtaining such professional advice.

One of the recommendations of the subcommittee on materials, loads and stresses is that welding, and in some instances bolting, be permitted as a cheaper means of construction and with a view to reducing noise.

This subcommittee also recommends an increase in permissible stresses of structural steel from 16,000 lb. to 18,000 lb. per sq. in., and a revision of the requirements in connection with wind pressure, with provision to be made in buildings for a wind load of 20 lb. per sq. ft. instead of 30 lb., as at present. It is recommended that the entire wind pressure be taken up in the frame of the building.

Proposed changes in the building code, it was stated, would effect savings of about 12 per cent in the cost of steel structures, this cost now representing 10 to 20 per cent of the entire cost of steel frame buildings.

Dinner Held for Apprentices at Milwaukee

The operating apprentice committee of the Milwaukee branch of the National Metal Trades Association held its annual booster dinner Nov. 11 in the Milwaukee vocational school, with Dr. Robert L. Cooley, director of the school, as speaker. About 200 men attended the dinner and later made a tour of the school. The Milwaukee branch of the National Metal Trades Association reports a steady increase in the number of indentured apprentices due to the combined efforts of school, state and industry coupled with a comprehensive program of education and work for apprentices.

Four-Company Steel Merger Announced

Republic, Central Alloy, Donner and Bourne-Fuller Companies to Be Consolidated—
T. M. Girdler May Head Board—E. T. McCleary Probable President

CLEVELAND, Dec. 17. — Announcement was made here late today of the merger of important iron and steel companies which resulted in the formation of the third largest company in the United States.

At a meeting of the board of direc-

It is expected that T. M. Girdler, former president of the Jones & Laughlin Steel Corporation, will be chairman of the board of the new company. E. T. McCleary, of Republic, will be president. F. J. Griffiths, chairman of the board of Central Alloy,

a plant in Chicago in addition to acquiring the Foster plant in Cleveland. The Foster company has been in operation about 20 years and is understood to do an annual business of about \$2,500,000.



T. M. GIRDLER

T. M. GIRDLER, Former President of Jones & Laughlin Steel Corporation, is Slated for Chairman of the New Republic Steel Co. and E. T. McCleary, Now President of Republic, Will Continue in That Capacity in New Company



E. T. MC CLEARY

tors of the Republic Iron & Steel Co., E. T. McCleary, president, announced tonight, a plan was approved for the merger of his company, Central Alloy Steel Corporation, Donner Steel Co. and the Bourne-Fuller Steel Co. This plan will be submitted to the stockholders of the Republic company at an early date for their approval.

Similar action was taken by the board of directors of the Central Alloy Steel, Donner Steel and Bourne-Fuller companies, at which meetings the plan of merger was approved, and will likewise be submitted by each one of these companies to the stockholders for ratification.

Mr. McCleary said that the details of the merger are being worked out and will be made public later. He gave a general statement of the properties which will be included. These properties, which embrace a self-contained unit from raw materials to finished products, have combined total assets of approximately \$350,000,000 and combined total annual sales of about \$250,000,000. The total ingot capacity is approximately 4,900,000 tons a year. Pig iron capacity is estimated at about 2,400,000 tons.

The name of the new company probably will be the Republic Steel Co. As a working part of the merger there will be the Republic Research Co., to be devoted to exclusive research in all the processes and patents involved.

will be president of the research company, in charge of all the research and metallurgical work. The principal executives of the merged companies, in addition to the above, are B. F. Fairless, J. M. Schlendorf, of Central Alloy; H. T. Gilbert and W. M. Neckerman, of Republic; W. T. Witherow, of Donner, and R. S. Hall, of the Bourne-Fuller company. These, together with R. J. Wysor, formerly general manager of Jones & Laughlin, will constitute the active executive staff of the new company.

There was no announcement regarding the Youngstown Sheet & Tube Co. and the Inland Steel Co., which many had thought would be included in the merger when it was finally completed.

Lamson & Sessions Co. May Buy Foster Bolt

The Lamson & Sessions Co., Cleveland, has submitted an offer to purchase the Foster Bolt & Nut Mfg. Co., Cleveland, on an exchange of stock basis, and the directors of the latter company will hold a meeting this week to consider the merger. It is believed that the offer will be accepted. The Lamson & Sessions Co. recently acquired the Lake Erie Bolt & Nut Co., with plants in Cleveland and Birmingham. If it takes over the Foster company, it will also have

American Steel & Wire Co. to Rebuild Newburgh Works

The American Steel & Wire Co., Cleveland, plans to start an extensive rebuilding program at its Newburgh steel works in Cleveland early next year. While details have not yet been worked out, the plans call for dismantling of the old plant and replacing it with an up-to-date steel plant with an increase in open-hearth and rolling mill capacity. Extensions will include the building of a new open-hearth department with a battery of 150-ton furnaces and blooming and finishing mill equipment. The plant now has seven open-hearth furnaces of 60-ton capacity. The construction program will probably extend over a period of a year or more. The Newburgh steel works were originally built in 1867-68.

Mining Institute to Be Held at Seattle

The annual Mining Institute at the College of Mines of the University of Washington, which is open to all persons interested in any branch of the mineral industry, will be held this winter at Seattle throughout the week beginning Monday, Jan. 20, 1930. The extensive new equipment for mining, metallurgy, and ceramics recently installed in mines laboratory will be used for instruction and demonstrations. In addition to the lectures by the regular staff of the college there will be talks by representative engineers and operators of the Northwest. In the evenings moving pictures of mining operations will be shown. At the last session of the Mining Institute 120 persons were in attendance. No fees are charged.

Algoma Steel Corporation, Sault Ste. Marie, Ont., will place its new 18-in. bar mill in operation this week. Its new 12-in. mill will begin operating about Jan. 1. The mills will have double the capacity of the ones they replace.

Reduced Iron Rates from South Denied

Commerce Commission Refuses Plea for Lower Tariffs from Alabama to North Central Points

WASHINGTON, Dec. 17.—In a decision made public last Thursday, the Interstate Commerce Commission held to be not justified proposed reduced rates on pig iron from points in Alabama, Tennessee and Kentucky to St. Louis and related or intermediate points in Illinois and Indiana. The schedules, which were under suspension, were ordered cancelled. They were filed by Southern carriers and supported by merchant blast furnace interests in the South. Opposing the schedules were pig iron producers in the St. Louis, Chicago, Cleveland, Youngstown, and Duluth, Minn., districts, consumers at Metropolis, Ill., Louisville and Newport, Ky., and Northern carriers.

From Birmingham to St. Louis, it was proposed to establish a rate of \$3.69 a ton, a reduction of 73c. from the present rate of \$4.42. Other proposed reductions ranged from 41c. to 72c.

The commission did not support the contention that the decline in tonnage of pig iron from Southern furnaces marketed outside of Southeastern territory was due to unfavorable rates. The accumulation of stock and depression were attributed in part to a general decline in the demand for pig iron, which has been felt by Northern as well as Southern pro-

ducers by reason of the increased use of scrap. In the South, it was said, it is particularly due to the depressed condition of the cast iron pipe industry.

On the other hand, the commission concurred in the protest of Northern lines that, if the proposed reduced rates were allowed to become effective, the Northern producers would demand corresponding reductions from their furnaces, which, "because of competitive conditions, they will find it difficult to deny." Central carriers expressed the view that, if the proposed rates became effective, the Southern carriers would later find it necessary to make reductions in the rates to the Ohio River crossings sufficient to restore the present relation to the rates to St. Louis.

"These protestants state that if this should be done, producers located on their lines would demand corresponding reductions in their rates to the same destinations in order to meet the competition from the Southern furnaces," the opinion said. "Due to the geographical location of the furnaces in Central territory such requests could not be granted without a general revision of all the pig iron rates in Central territory, resulting in a very substantial depletion of the revenue of the Central lines."

Little Steel Improvement Expected Before March

The trend in the use of scrap in steel manufacture has been upward since 1923, with the trend of pig iron downward, declared Prof. Spurgeon Bell, head of the Bureau of Business Research, Ohio State University, at a meeting of the Cincinnati chapter of the Institute of Scrap Iron and Steel, held at the Deschler Hotel, Columbus, Ohio, on Dec. 11. By means of charts, Professor Bell demonstrated that the scrap market is a barometer of conditions in the steel industry.

In analyzing the prospects for the steel industry in 1930, he stated that the recession in steel operations would continue further beyond the beginning of 1930 than in previous years, with the result that there will possibly be no marked improvement until March or in the second quarter of the year. The conditions in the automobile, railroad and construction industries, however, warrant the prediction that the year 1930 will show good prospects for the steel industry.

"The prospects for the steel industry in 1930 are tied up with the prospects of the three principal consumers of steel—the automobile industry, the railroad industry and the construction industry.

"The automobile industry will continue on a lower scale in 1930. The delay brought about by the change in the Ford model developed a big deferred demand for cheaper cars in 1929, amounting to nearly three quarters of a million cars. When this demand was satisfied during this year, we were confronted with a normal demand for automobiles. In 1930, the demand should be approximately 500,000 cars less than in 1929.

"In the construction industry, the years 1921 to 1925 saw the largest boom in construction, with the result that the post-war demand for construction was satisfied during this period. The bull market discouraged speculative construction, and money was diverted to the stock market, bringing a decline in construction during 1929. The factors that should bring about an improved demand in the construction industry are the following: Rents have declined from 1925 to 1929, and the rent curve has now flattened out and is more stabilized. The cost of construction, which declined over a period of years, became stabilized in the middle of 1929. Interest rates will be easier as the result of the deflation in the stock market.

"The general expectation that a tremendous flood of money will now

be available for the mortgage market is somewhat overdone. Capital is scarce all over the world, and there probably is not the large demand for bonds that some people expect. My own opinion is that it will not be long before another bull market will result.

"The railroad situation is particularly favorable for 1930. A good demand began in 1929 and will go forward in the next year. The excess demand in the railroad situation will offset any loss in the automobile industry.

"All indications are that the present decline in steel production will go further this time than in years past. There will possibly be no improvement until March, 1930, with the first quarter poor, the second quarter better and the second half improved."

Market Research in the Malleable Industry

The scope of activities of the Malleable Iron Research Institute will be materially enlarged in order to broaden the field for malleable castings. Action on the extension of work of the organization was taken at the annual meeting of the institute held in Cleveland, Dec. 11.

Laboratory and metallurgical work up to the present has dealt mainly with improving the quality of the product and the efficiency of plant operation. This phase of production research will be continued on an enlarged scale, supplemented by comprehensive plans for shop practice and product inspection services. In addition a broad program of market research will be undertaken which will include a comprehensive survey of the industry.

This will embrace thorough studies of new uses and applications, of specifications of materials for specific purposes and of the study of marketing conditions as affecting the use of malleables, all of which will be supported by a broad program of co-operative advertising. One subject that will be considered will be the provision of different specifications for malleable castings providing specifications for castings for different services to supplement the present single standard specifications of the institute. For the effective conduct of the enlarged activities the personnel of the institute will be increased by an additional administrative executive and field engineers.

R. R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill., who became president of the institute early in the year to fill the vacancy caused by the death of Frederick L. Sivyver, was elected president for the ensuing year. Other officers elected were: vice-presidents, John G. Malnoski, Muncie Malleable Foundry Co., Muncie, Ind., and Joseph P. Kennedy, Baltimore Malleable Iron & Steel Castings Co., Baltimore; secretary-treasurer, Robert E. Belt, Union Trust Building, Cleveland.

This Issue in Brief

Wanted: skilled mechanics. Even in relatively dull times skilled mechanics can no longer be hired at will. Apprenticeship training is the only answer to the serious problem facing industry.—Page 1662.

* * *

Tool life not increased much by coolants, but they do improve the finish, tests reveal.—Page 1704.

* * *

You waste fuel if you operate your cupola slowly, and the iron undergoes undesirable changes. Uniform output can be obtained at high melting speed.—Page 1659.

* * *

Millions of dollars in transportation costs being saved by river shipments of iron and steel products. Increased competition forces great growth in barge transportation.—Page 1661.

* * *

Greater strength of pressure die castings than in the gravity type is due to difference in structure of metal. Improved zinc-base alloys have greater tensile strength than sand cast brass or bronze.—Page 1658.

* * *

Longest life in broadnose lathe tools is obtained with a back slope of 30 deg. Side slope of 0 deg. is better than one of 8 deg.—Page 1704.

* * *

Doubles machine shop output without buying new equipment. Shop rearrangement, material routing system and incentive system are responsible.—Page 1649.

* * *

Anneals aluminum aircraft engine castings at 960 deg. Fahr. For economy in handling, an electric truck-loading oven is used. It handles two cars.—Page 1650.

Your machine shop costs will fall if you establish standard speeds and feeds. The use of these standards is habit-forming among workmen.—Page 1649.

* * *

Don't expect wage incentive plan to produce wonders, unaided. Bad practices must be corrected. The new plan must be carefully fitted into the shop program.—Page 1647.

* * *

High-speed steel's most important constituent is cobalt, tests reveal. Five per cent is the maximum for economy. Best results are obtained only with high hardening temperature.—Page 1704.

* * *

Dished disk springs have many advantages for application where space is limited. They are cheap, durable, adjustable in height and flexibility.—Page 1664.

* * *

To safeguard crane operator, support the cab separately from load, says tramrail maker. Then if the operator tries to pick up something attached to the floor and the load-carrier breaks, the operator will not be hurt.—Page 1662.

* * *

Increases stockroom capacity 400 per cent and saves cost of new building by standardizing on parts containers, piling them four or five high, and handling them with overhead conveyor.—Page 1654.

* * *

Decreased machining and assembly costs are frequently obtained by using die castings with steel inserts. Alloy shrinks just enough to anchor the insert so firmly that the casting must be broken before insert can be removed.—Page 1658.

Simplifies stock-keeping system by establishing a definite stock run for each model of machine. Then washing-machine manufacturer orders just enough parts for the stock run.—Page 1654.

* * *

Output of foundry increased 75 per cent without additional help or equipment. Arrangement of flasks in orderly manner, delivering to molders the patterns next required, and wage incentive system are responsible for marked savings.—Page 1649.

* * *

Cupola is no longer "she." It is a piece of mechanical equipment, and therefore subject to laws of mechanics and physics.—Page 1659.

* * *

Don't hamstring the new machine by putting on the whole burden of cost reduction. Flow of material, men and methods must be coordinated if best results are to be obtained.—Page 1647.

* * *

Salvages imperfect aluminum castings by preheating to 900 deg. Fahr. in welding furnaces and filling up the blowholes by welding the hot castings.—Page 1651.

* * *

Modulus of elasticity of a metal is not an absolutely fixed quantity. Overloading in tension beyond the yield point lowers the modulus of elasticity with respect to future lighter loads.—Page 1665.

* * *

New field yields low-cost, high grade iron ore. Normandy, France, region develops into one of the world's large iron ore reserves.—Page 1667.

* * *

Economical cutting speeds for finishing cuts can now be determined accurately. As a result of exhaustive tests, engineers evolve formulas for both high-speed steel and carbon-steel tools.—Page 1663.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Next Year's Steel Prospects

BOTH precedent and an analysis of policies of steel buyers at the moment indicate that this year's lame ending in steel demand is not a criterion of what the early months of the new year will show. It was pointed out in this department in the issue of Oct. 24, exactly before the series of stock market crashes had begun, that each year in steel seems to take a fresh start, that if the old year ends well the new year carries the momentum, while "apparently if a year ends poorly demand accumulates."

With the limited number of years we have had since the post-war inflation and deflation there has been supplied a remarkably wide variety of precedent that good or bad endings of a year mean nothing to the new year. There was 1923, with monthly declines in steel production after April and clear through December, yet with 1924 opening very well indeed. It ran into bad things after March, but that had absolutely no connection with the 1923 ending. Then there was 1927, with its whole second half bad, and 1928 started out well, incidentally ending still better.

So much for the reassurance of precedents, that there is no precedent of a poor year ending being carried over. In the various cases the seasonal influence was too strong. As to the attitude of steel buyers, the unsettlement produced by the stock market, waning of late, induced a policy all along the line of particularly drastic curtailment of stocks. The application runs from the primary raw materials along down to final consumption, in many cases through numerous stages.

Steel mills themselves have been curtailing in this respect, whereby on a given date their ingot production is below the usual ratio to the shipments of finished products. The manufacturing consumer, the further manufacturer, if any, and the dealer all curtail. There may have been no stocks that could be called reserve stocks, but stocks that are ordinary stocks in ordinary times look too large in times like these, and with declining operations the volume of material in progress is reduced. Thus almost everywhere less has been going into a manufacturing establishment or a warehouse than has been coming out.

After the turn of the year, which involves the formal Jan. 1 inventory with its influence upon the balance sheet and the year's financial showing in general, and also involves a sudden commencement of looking forward to seasonal spring activity and

preparation for it, the reverse action or rebound is in order. After rigid curtailment the disposition will be to return toward, if not to, normal or average. There will be a favorable sentimental influence.

In the last few years we have been much disposed to write "sentiment" and "tone" out of consideration of market or trade conditions, but no one can fancy that, if complete departure did occur, the very special developments of the last few weeks would not bring a reversal. Whereupon we may reasonably expect that unfavorable sentimental influences of the last few weeks will be replaced by more favorable sentiment as actual seasonal revival in trade begins to appear.

Ties Among Industrial Nations

PAYMENT of international war debts is going to involve sales development of enormous proportions. In times past, international obligations could be discharged by the payment of tribute to a royal treasury in gold, ivory, jewels or other exotic material. Such possibilities hardly exist today.

Direct payment in competing goods could not well be accepted unless demand could be expanded sufficiently to absorb the foreign products without at the same time checking the sale of the home products. Prohibitive tariffs give effect to refusals of nations to accept payments in goods; and the objection to payment in services, competing with the labor of the creditor nation, is also strong.

The result is that debtor nations must exchange their domestic products with countries which are the sources of exotic raw materials or of products which the creditor nations are willing to accept. Meanwhile demands of the debtors for increased capital to finance their growing business attract private loans from the creditors. Interest charges upon the debtor nations accordingly grow larger, intensifying the need of more export trade to be gained at the expense of the creditor nations.

It ought to be generally recognized that, while a high protective tariff is calculated to foster the development of the home industries, it is also forcing the development of the industries of debtor nations, for the investment of capital in foreign industries will strengthen the foreign industrial position. Thus the industrial nations will tend to be tied together more and more by international investments and industrial organizations—a condition which may be a powerful factor in the promotion of world peace.

Trends Regarding Old Age Pensions

THE movement in favor of the state paying old age pensions is growing. The sentimental appeal is so strong that we may rest assured from a purely psychological viewpoint that sentiment is the chief motivating force. Mortality statistics and facts in commerce and industry as to changing character of gainful occupation are naturally cited to help support the case. Putting sentiment entirely out of the reckoning, the purely factual trends affecting this problem may be reviewed. They include items of longevity, life insurance and annuities, thrift, housing conditions and character of occupation.

Mortality statistics are often cited loosely, particularly so when only life expectancy is mentioned. That has sharply increased, but chiefly by reason of a large decrease in infant mortality. The life expectancy of those aged 50, say, has not greatly increased. What one would like to do is construct series of curves, of this and other things, and combine them into one general curve showing how, from a purely statistical and factual basis, the need of pensions has varied over a period of time, say in a generation. The curve showing variation in life expectancy of those aged 50 would not be a final showing because physical condition of the more aged may vary from time to time. Improved habits of life are directed not so much at prolonging mere existence as at preserving physical and mental ability. A curve should be plotted for that item also.

The great increase in life insurance and annuities is an outstanding fact, and it plainly is in the direction of lessening the need of state old age pensions.

The change in habits of "thrift," whatever that may mean precisely, would if measurable make a particularly interesting curve, bearing on this general subject. On the one hand we have the increase in savings banks deposits and on the other hand the greatly increased tendency to buy not only what one has cash to pay for but to buy on installments, and however simply the proponents of one pension idea or another may put it, the data by which the thrift curve should be compiled are really very complicated.

The curve as to housing conditions is relatively much simpler but even it has some complications. For recent years there are statistics of housing construction, showing a continuous decrease in the proportion of facilities provided in one-family dwellings. In this and other ways the trend has been marked, for people to live in smaller quarters, whereby relatives have less facilities to take care of those who cannot take care of themselves.

In character of occupation we have the greatest changes, requiring in fact a series of curves. Obviously the farmhouse can better take care of its aged than the city dwelling, and the proportion of farming population shows a steady trend downward. Next there is the trend from individual business to working for hire, very marked as a purely statistical matter but very untrustworthy for purposes of conclusion, for the man in business may be less disposed to lay up for old age than the salaried man or wage earner. He may trust too much to his business while an increasing proportion of wage earners are protected by their employers. Then in factory work we have sharply increasing mechanization, whereby some work is made easier for older men and some work is made impossible.

Everyone readily feels the fascination of sentimental arguments for and against state pensions. The purely statistical and material items also have their fascination for they present interesting complications, while at the same time they represent trends which have been in force and are altogether likely to continue in force.

The Place of the Visiting Nurse

A SURVEY has been made lately of the results of the work carried on among employees and their families by the visiting nurses who have been for the past ten years on the staff of a large manufacturing company in New England. All through the decade detailed records were kept of the two nurses' visits to employees' homes. These included the name of the person who needed care, whether worker or member of his family, the nature of the ailment, number of visits required in each case, and any other fact that seemed worth recording. The data accumulated were found ample for purposes of analysis. According to officials the opinion was confirmed that the visiting nurse system gives a large return on the outlay. The nurse has proved to be the most intimate and perhaps the most valuable means of contact between the company and its employees, and as such to have contributed much to the maintenance of works morale at the high standard that has been in evidence in various ways.

The industrial nurse is no longer a rarity. At many industrial plants large enough to justify the money cost she has become an adjunct of hospital or dispensary. Groups of smaller plants have worked the plan on a cooperative basis, and others have availed themselves of the community's district nurses. But not a great deal has been made public as to the results of the nurses' work. In the case in question, conclusions were based on between 35,000 and 40,000 professional visits. In 1928 alone the nurses made 3800 calls, an average not much under one to the employee, and considerably more than one for each head of a family.

Far the greater number of patients attended were not employees but members of their households. They have been encouraged to regard the nurse as some one to call upon in time of need, not as a special privilege but as a right. They do not wait for the news of their troubles to reach the authorities in some round-about manner. They notify the hospital and ask for a nurse. In fact, sometimes they demand her immediate presence; and this the management, instead of resenting, rather welcomes as a symptom that the nurse is accepted as an integral factor in the institution. It was not so in the beginning of the work. She was met with suspicion and aloofness. Espionage was suspected. She often received scant welcome, and sometimes was refused admittance, usually by the housewife. But patience and tact finally won the day.

The position of the plant nurse today is that of family confidante to people of a wide range of nationalities and creeds. They have learned that she holds a secret inviolate, and never tells of things she sometimes sees, the betrayal of which might make trouble. Particularly in matters of hygiene is her influence marked. Cleanliness has become more nearly uni-

versal. The family diet, including the dinner pail of the wage-earner, has become a very different affair.

In the opinion of the works physician the health of workers and their dependents is much better than would have been the case with no nurse working among them. In the plant she has been a direct influence in reducing absenteeism, as there is no need

that men stay at home to care for the sick. Worry, which destroys efficiency, has been to no small extent alleviated. Altogether there is good ground for the statement of an officer of the company referred to that, if the time should ever come when personnel activities are curtailed, one of the last features to go would be the work of the visiting nurse.

Optimism Features Steel Foundry Meeting

Operations Excellent and Outlook Good, According to Those Attending Pittsburgh Meeting

THE outlook in the steel castings industry is excellent, according to statements by 65 executives at the regular monthly meeting of the Steel Founders' Society of America, Inc., held at the William Penn Hotel, Pittsburgh, Dec. 12.

The present rate of operations was reported as 86 per cent of capacity in the Eastern district, 92 per cent in the Middle West and 100 per cent in the Central Atlantic district. The average for the past decade has been between 55 and 60 per cent of capacity. Shipments are now running at 95 per cent of capacity, and inquiries show only a slight decrease as compared with the same period a year ago. Raw material prices were reported as having shown a slight decrease except in Detroit and in Ohio, where large purchases had recently caused a sudden upward trend in scrap quotations.

With but few exceptions manufacturers of railroad castings, automotive and mill equipment, as well as producers of miscellaneous steel castings, pronounced the present volume of business and the future outlook favorable. Sales prices have been advanced on practically all classes of work, and present bookings run two months into 1930.

The fact that 75 leading executives of the industry attended the meeting indicates the interest that is being taken in the society under its new plan of organization. The proper application of cost-finding methods, the correction of loose trade practices and customs, and the checking of overexpansion and internal dissension are among the problems stressed in the society's program. Results have already been achieved in connection with balancing capacity with demand, as evidenced by the reported abandonment of a number of poorly conceived projects.

Has Employment Bureau Already Operating

The society has had an employment bureau in operation for several weeks, and as a first step in handling trade disputes has formally indorsed and adopted the principles of the American Arbitration Association.

Plans were laid for establishing a special group within the society for

producers of alloy steels and special acid, heat and corrosion-resisting products, so that their particular problems can be handled more effectively.

At a meeting of the Small Castings Division, led by H. J. Koch, Fort Pitt Steel Casting Co., McKeesport, Pa., a permanent organization was effected and a program of subjects to be presented at future meetings was developed. The group will confine its work largely to questions of merchandising and distribution, although operating phases of the business will also be covered.

Society's Data Effect Savings in Operating Costs

The chairman of the Large Castings Division, George H. Friesel, United Engineering & Foundry Co., Pittsburgh, led a discussion of operating data compiled by the society, as a result of which one member stated that his company had saved \$18,000 in operating costs, while another reported a definite saving of \$6,000.

The general meeting was presided over by the society's vice-president, John E. Galvin, president, Ohio Steel Foundry Co. Granville P. Rogers, managing director, read a report in which he called attention to the work now being done by the cost accounting committee, which will make recommendations for improvements in present practice, after which the methods developed will be ratified and a continuous effort will be made to obtain general adherence to a uniform plan. He reported the progress made to date in developing a standard set of trade customs and a standard sales contract.

An address on "Undeveloped Wealth in the Steel Foundry" was made by George Batty, technical director, Steel Casting Development Bureau, Philadelphia. He called attention to the fact that foundry superintendents acquire a large amount of data on foundry operation that they do not fully understand and, if they do, do not have the time, opportunity or training to deduce from their observations improved practices or remedies for adverse conditions noted. These empirical facts existing in the minds of foundry operators constitute unexploited wealth, he de-

clared, for if they were collated scientifically new methods could be devised that would materially reduce wastes in both material and human energy.

New England Construction Interests Meet

At a joint meeting of sales staffs of various companies handling structural steel, gypsum, brick, terra cotta, lath, bar joists, etc., under the auspices of the Structural Steel Board of Trade of New England at the Copley-Plaza Hotel, Boston, on Tuesday, Dec. 10, Lee H. Miller, chief engineer, and Charles F. Abbott, executive director, American Institute of Steel Construction, Inc., were the speakers. The meeting was presided over by Harry W. Fitts, New England Structural Steel Co. Charles N. Fitts, president of the national organization, attended.

Mr. Miller's address largely concerned recent developments in fabricating methods. Special emphasis was placed on battled floor and its advantages in construction of tall buildings. In connection with steel floor plates attention was called to an automatic welding machine developed by the General Electric Co., which was demonstrated at the recent annual meeting of the American Institute of Steel Construction. The new welder is operated by one man.

Mr. Abbott's address was largely on salesmanship. He said, in part, that while financing and manufacturing are highly important branches of industry, our great problem today is distribution. He pointed out that a great many salesmen lack terminal facilities—they do not know when to stop. A salesmanship survey recently made, he said, showed that 1714 untrained salesmen sold \$19,000,000 worth of goods in a given time, while 500 trained men, in the same period, sold \$50,000,000 of the same kind of goods. Just how seriously American industry is taking the distribution problem, Mr. Abbott stated, can be realized when it is known that it is spending \$6,000,000 annually in sales promotion, as compared with \$200,000 so expended 10 years ago.

Mr. Abbott assured those present that the use of fabricated steel in 1930 will exceed all previous yearly records in this country, and that 1931 will be an even greater year than 1930. He predicted the erection of 100-story buildings on large city plots.

Steel Corporation May Acquire Atlas Cement

An offer to acquire the Atlas Portland Cement Co., through an exchange of stock has been made by the United States Steel Corporation, according to a letter sent by the Atlas company to its stockholders. The letter, signed by John R. Morron, president of the company, asserts that officers of the company consider the offer very favorable, and urges stockholders to approve. A special meeting of stockholders of the Atlas company will be held Dec. 28 to act upon the proposal.

The transaction will involve 180,000 shares of United States Steel common stock in return for the outstanding stock and the entire assets of the cement company.

The capitalization of the Atlas Portland Cement Co. consists of 899,211 common shares, so that, at \$167 a share for Steel common, the deal would involve slightly in excess of \$30,000,000. In addition, the Steel Corporation offers to assume all existing liabilities of the company.

This contemplated expansion of the Steel Corporation would bring its rated Portland cement capacity to approximately 36,500,000 bbl. annually, constituting by a considerable degree the largest unit in the industry. The Atlas company and the Universal Portland Cement Co., the latter the cement subsidiary of the Steel Corporation, are among the four largest producers in the country, and their consolidation will place the leading steel producer in a dominant position in the cement industry.

Holders of a substantial majority of the stock of the cement company have given their approval of the transaction, and the directors have voted to accept the terms of the Steel Corporation.

Manufacturers of Resistance Welders Consolidate

Consolidation of the Thomson Electric Welding Co., of Lynn, Mass., and the Gibb Welding Machines Co., of Bay City, Mich., has been effected. The new company is known as the Thomson-Gibb Electric Welding Co. Both plants will continue in operation.

The former company is a pioneer, having been formed in 1886 to exploit the basic patents of Prof. Elihu Thomson. Professor Thomson has always been an officer and director, and will continue with the new company in both capacities. The Gibb company has been one of the most active in the West and has specialized in seam welding.

The Thomson-Gibb Electric Welding Co. will market a full line of butt, flash, seam, spot, projection, and wire fabric welders. It is fully aware that the user of welding machines is not so much interested in the machine as in

the product of that machine, both from the standpoint of uniformity, and of uninterrupted production. The welding machine is but one of many special machines in a manufacturing plant. It is impossible to have in an organization an individual who would be as well acquainted with the welding machine itself and its ultimate capability as is the manufacturer of

that machine. Therefore, the Thomson-Gibb company proposes to maintain service engineers to make frequent inspection calls upon its customers and to act in an advisory capacity. For this purpose competent factory trained engineers will be stationed at Boston, New York, Philadelphia, Cleveland, Cincinnati, Detroit, Chicago and St. Louis.

The Week in Business

Drift of Current Financial and Economic Opinion

WIDELY differing views on the business situation indicate a persistence of the confusion and perplexity into which the country was thrown by the stock market panic.

Col. Leonard P. Ayres believes it unlikely that the current trade recession will develop into a depression. "Speculation has come out of the stock market in a hurry," he writes, "but by and large we have no great amount of speculation to come out of business."

Sees No Early Recovery

A sharply divergent opinion is held by the *Annalist*, which says that "it has become clear that the business reaction is much more severe than had been generally believed," adding that no important recovery is in prospect for several months. A preliminary calculation of the *Annalist* index of business activity for November showed a drop of 10 points, the greatest decline in 11 years and comparing with a recession of 7.6 points in January, 1921, the sharpest previous monthly decrease recorded.

A survey of the whole field of business, according to Benjamin Baker, editor of that journal, forces the "realistic" observer to be skeptical of the ultimate value of the Washington program of "cheerio." "It is a good thing for the leaders of business to consult, and to try to work out a practicable stabilizing program; but to ignore facts is to court defeat."

But Forecasters Often Err

Less faith in the forecast value of statistics is shown by Alexander D. Noyes, *New York Times*, who points out how frequently business analysts have erred in recent years, even in near-range prophecy. He says, in part:

A year ago this month not a single voice predicted the main event of 1929,

the October panic. On the other hand, forecasts for such a twelve-month as 1926 were extremely guarded in relation to the last half of the year—a caution which turned out to have been unnecessary. On New Year's Day in the year of spectacular deflation of staple prices, 1920, the majority of experts prophesied over their own names that prices could not decline.

Of recent years it has grown to be a habit of December prophets to describe with confidence the course of events in the next six months; but to beg off from telling the secrets of the autumn. Yet at the start of 1919, a year of inflated wages and profuse expenditure by the working classes, high authorities predicted "bread lines in every industrial center before May 1."

Recognizing that sentiment is, after all, a leading force in shaping business, Mr. Noyes concludes that the President's vigorous program has added great force to other psychological considerations and "may turn out to have influenced tangibly the general course of trade."

Federal Reserve Policy Criticized

Also stressing the importance of building up business confidence, the *Financial Chronicle* finds that efforts to that end by the President's conferences are being vitiated by Federal Reserve policy. By adding heavily to their holdings of Government securities and acceptances the Reserve banks are creating unneeded credit and are driving gold out of the country. This outflow of yellow metal, the *Chronicle* declares, is the disturbing influence that caused the last severe setback in the stock market.

Condemning what it calls a repetition of the easy money policy of 1927, which forced large exports of gold to Europe and encouraged stock market inflation, the financial journal characterizes present open market operations as "a meddlesome interference with the natural functioning of the Reserve system," which "should be discontinued for the benefit of all concerned."

Iron and Steel Markets

Further Shrinkage in Production

Steel Output Receding as Buyers Defer Purchases—

Motor Car Output Rising—Scrap Steady—

Semi-Finished Steel Weakens

THE anomalous situation of production shrinking and confidence rising characterizes the steel market as the year-end approaches. Producers are now satisfied that the sharp decline in steel output that began in late October was a psychological effect of the stock market crash and greatly exceeded the actual contraction in steel consumption.

The damper that the Wall Street panic put on steel buying, it is believed, greatly accentuated a trend that was already under way, giving the appearance of a sharper reduction in demand than actually occurred except in the automobile industry. The effect on buyers has been to make them still more cautious, with most of them drastically cutting down their inventories and withholding action on their first quarter needs.

Prices of finished steel are feeling the strain of curtailed buying, and pressure for concessions, particularly on the part of the automobile makers, is insistent. But steel producers are not attempting to force sales and have become reconciled to a further reduction of mill operations before Jan. 1. Prices of some products are wavering, particularly certain finishes of sheets, but there have been no additional open breaks in the market.

Mills believe that customers will be forced to enter the market in January, possibly in sufficient numbers to create a rebound in demand comparable with the recent slump in buying.

In this connection the immediate translation of expanding motor car production into steel orders is regarded as significant. While the rise in automobile output is slow and steel producers are not yet disposed to look for a real recovery before the end of the first quarter, the outstanding fact is that the trend is upward. Makers of low-priced cars are getting under production more rapidly than those manufacturing more expensive models. The Ford Motor Co. is understood to have a daily schedule of 4500 cars this week, a gain of 700.

While none of the motor car builders is making extended commitments in steel, improvement in orders and releases is making itself felt, particularly in carbon and alloy steel bars. Two of the larger independent mills in northern Ohio have increased ingot output to 60 per cent of capacity.

Ingot production generally is still declining. The average for both the Steel Corporation and Bethlehem plants is down to 65 per cent, compared with 68 per cent a week ago. Chicago district output is holding at 65 per cent, but the rate for Pittsburgh and

tributary areas has gone down five points to 60 per cent and may drop as low as 50 per cent in another fortnight. Plans call for a sharp reduction of finishing mill operations, with the likelihood that many sheet, strip, bar and tin mills will suspend completely during Christmas week.

Support of the market by the railroads, the structural steel industry, farm equipment makers and shipyards has not relaxed and demand from some of the miscellaneous users shows signs of reviving. Releases from barrel manufacturers have improved and the requirements of wire rope makers are large. Heavy machinery and equipment makers will enter 1930 with unusually well filled order books.

Scrap, which is regarded as a sensitive barometer, remains firm for second week at Pittsburgh and Chicago, with several advances of minor grades reported at the latter point.

Semi-finished steel, on the other hand, shows weakness. A few Ohio mills have reduced billets, sheet bars and slabs \$1 to \$34 a ton.

Washington construction programs will not stimulate business for some time, but activity in structural steel remains at a high level. Fabricating awards total 51,000 tons, compared with 35,000 tons last week. Fresh inquiries call for 42,000 tons.

The Canadian National Railways have ordered 4650 cars and the Milwaukee road is in the market for 2300. The Louisville & Nashville is expected to inquire for 1823 cars.

The deadlock that exists between buyers and sellers of steel is duplicated in large measure in pig iron. Curtailment of blast furnace operations has tended to keep production in step with reduced demand, although some piling up of iron is reported at Chicago. In certain centers accumulating requirements have forced melters to increase their purchases, but in other districts foundry operations have fallen off and considerable unshipped tonnage will be carried over into the first quarter. Prices are softer in New England and have declined 50c. a ton in eastern Pennsylvania. Alabama producers have advanced quotations 50c. to \$15 a ton, Birmingham.

The merger of the Republic, Central Alloy, Donner and Bourne-Fuller companies will have a combined ingot capacity of nearly 5,000,000 tons a year, making it the third largest steel company in the country.

THE IRON AGE composite price for pig iron has declined from \$18.29 to \$18.21 a gross ton, a new low for the year. Finished steel is unchanged at 2.362c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Dec. 17, 1929	Dec. 10, 1929	Nov. 19, 1929	Dec. 18, 1928
No. 2 fdy., Philadelphia.....	\$20.76	\$21.26	\$21.26	\$21.26
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.....	17.69	17.69	17.69	20.19
No. 2, Birmingham.....	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*.....	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa.....	19.50	19.50	19.75	20.25
Basic, Valley furnace.....	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh.....	20.76	20.76	20.76	20.01
Malleable, Chicago*.....	20.00	20.00	20.00	20.00
Malleable, Valley.....	19.00	19.00	19.00	18.25
Gray forge, Pittsburgh.....	19.76	19.76	19.76	18.76
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace.....	100.00	100.00	105.00	105.00

Rails, Billets, etc., Per Gross Ton:

Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Re-rolling billets, Pittsburgh.....	35.00	35.00	35.00	33.00
Sheet bars, Pittsburgh.....	35.00	35.00	35.00	33.00
Slabs, Pittsburgh.....	35.00	35.00	35.00	33.00
Forging billets, Pittsburgh.....	40.00	40.00	40.00	38.00
Wire rods, Pittsburgh.....	40.00	40.00	40.00	42.00
Skelp. prvd. steel, P'gh, lb.....	1.85	1.85	1.85	1.90

Finished Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.90	1.90	1.90	1.90
Bars, Chicago.....	2.00	2.00	2.00	2.00
Bars, Cleveland.....	1.90	1.90	1.90	1.90
Bars, New York.....	2.24	2.24	2.24	2.24
Tank plates, Pittsburgh.....	1.90	1.90	1.90	1.90
Tank plates, Chicago.....	2.00	2.00	2.00	2.00
Tank plates, New York.....	2.17½	2.17½	2.17½	2.17½
Structural shapes, Pittsburgh.....	1.90	1.90	1.90	1.90
Structural shapes, Chicago.....	2.00	2.00	2.00	2.00
Structural shapes, New York.....	2.09½	2.09½	2.09½	2.14½
Cold-finished bars, Pittsburgh.....	2.30	2.30	2.30	2.20
Hot-rolled strips, Pittsburgh.....	1.90	1.90	1.90	1.80
Cold-rolled strips, Pittsburgh.....	2.75	2.75	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel,	Dec. 17, 1929	Dec. 10, 1929	Nov. 19, 1929	Dec. 18, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh.....	2.75	2.75	2.75	2.85
Sheets, black, No. 24, Chicago.....	2.75	2.85	2.85	2.95
dist. mill.....	3.40	3.40	3.40	3.60
Sheets, galv., No. 24, P'gh.....	3.40	3.40	3.40	3.60
Sheets, galv., No. 24, Chicago.....	3.50	3.50	3.50	3.70
dist. mill.....	2.35	2.35	2.25	2.20
Sheets, blue, No. 13, P'gh.....	2.45	2.45	2.45	2.30
dist. mill.....	2.40	2.40	2.40	2.65
Wire nails, Pittsburgh.....	2.45	2.45	2.45	2.70
Wire nails, Chicago dist. mill.....	2.40	2.40	2.40	2.50
Plain wire, Pittsburgh.....	2.45	2.45	2.45	2.55
Barbed wire, galv., Pittsburgh.....	3.05	3.05	3.05	3.30
Barbed wire, galv., Chicago.....	3.10	3.10	3.10	3.35
dist. mill.....	\$5.35	\$5.35	\$5.35	\$5.25

Old Material, Per Gross Ton:

Heavy melting steel, P'gh.....	\$15.25	\$15.25	\$16.00	\$18.00
Heavy melting steel, Phila.....	14.50	14.50	15.00	15.00
Heavy melting steel, Ch'go.....	12.50	12.50	13.00	14.50
Car wheels, Chicago.....	13.50	13.50	14.00	14.00
Car wheels, Philadelphia.....	15.50	15.50	15.50	16.50
No. 1 cast, Pittsburgh.....	14.50	14.50	15.00	14.50
No. 1 cast, Philadelphia.....	15.00	15.00	16.00	16.25
No. 1 cast, Ch'go (net ton).....	13.50	13.50	13.50	15.50
No. 1 RR. wrot., Phila.....	15.50	15.50	16.00	15.50
No. 1 RR. wrot., Ch'go (net).....	12.00	12.00	12.25	13.25

Coke, Connellsville,

Per Net Ton at Oven:	Dec. 17, 1929	Dec. 10, 1929	Nov. 19, 1929	Dec. 18, 1928
Furnace coke, prompt.....	\$2.65	\$2.65	\$2.65	\$2.75
Foundry coke, prompt.....	3.75	3.75	3.75	3.75

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	18.12½	18.12½	18.12½	16.12½
Electrolytic copper, refinery.....	17.75	17.75	17.75	15.75
Tin (Straits), New York.....	41.37½	39.62½	39.75	49.62½
Zinc, East St. Louis.....	5.50	6.00	6.25	6.35
Zinc, New York.....	5.85	6.35	6.60	6.70
Lead, St. Louis.....	6.10	6.10	6.10	6.35
Lead, New York.....	6.25	6.25	6.25	6.50
Antimony (Asiatic), N. Y.....	8.50	8.62½	8.62½	9.87½

Pittsburgh

Steel Buying Restricted to Small Lots—Moderate Improvement in Orders from the Automobile Industry

PITTSBURGH, Dec. 17.—While business with some of the mills in this territory is somewhat better than it was a month ago, buying is still restricted to small lots, and the great majority of the larger consumers who might be expected to cover their first quarter needs at this time are holding back. Nevertheless, sentiment in the industry is good, and the expectation of renewed demand in January continues.

Notably encouraging in the last week has been the placing of small orders by automobile manufacturers, but the volume of business from this source by no means promises a heavy demand during the first quarter. In fact, estimates of automobile production in the first quarter by many of the leading manufacturers range from 20 to 40 per cent of the rated capacity of plants, and the high January quota of the leading maker of cars in the low-priced field is certainly not to be taken as a criterion of the industry as a whole.

However, the immediate Pittsburgh district is not so dependent upon the automobile industry as are mills in the Valleys and the Wheeling area, and the prospects of demand for the steel products which do not go to the automobile makers are not so obscure. Heavy demand for plates, shapes and heavy sheets from the railroad car builders is assured by the large orders on their books, and the outlook for barge and shipbuilding work is much better than it was this time last year. Continued industrial expansion in this

vicinity insures a good demand for structural material from this source alone, and plans for important public improvement work promise a substantial business. Lower money rates are already stimulating general building activity, which was impaired considerably in the year coming to a close.

Plans of the agricultural implement industry for 1930 call for no curtailment of earlier schedules. Heavy machinery and equipment makers normally absorb a good percentage of Pittsburgh's finished steel products,

and companies engaged in this work will enter 1930 with unusually well filled order books.

The outlook for pipe is more or less uncertain, but there is no reason to believe that the usual seasonal demand will not set in as the year progresses.

Under these circumstances, mills are certainly justified in facing the new year with a fair degree of confidence.

Steel users are allowing their stocks to decline to the absolute minimum at this time and mills are meeting this situation with plans for sharply curtailed production in the next fortnight. This week finishing mills are at a slightly better rate, but Christmas week will see complete suspension of operations in many sheet, strip, bar and tin mills.

Ingot operations for the Pittsburgh and tributary districts may be expected to decline to about 50 per cent of capacity, and present schedules of open-hearth departments are certainly not higher than 60 per cent.

Prices on finished steel products are feeling the strain of curtailed buying, but in no cases have open breaks occurred. Mills are carefully avoiding any semblance of pressure upon buyers, but the latter, particularly in the automotive industry, are inclined to

press for concessions all through the list. Many small buyers have been willing to extend their present contracts at unchanged prices, but large users are waiting market developments and many already indicate that lower quotations have been offered them. Under such circumstances, it is safe to assume that first quarter prices will receive no real test until January.

Pig Iron.—A few small inquiries have come out in the last week but none of these calls for other than current needs. In fact, orders are occasionally placed for split carloads of two grades of iron, and it seems that consumers are determined to have no stocks at the end of the year. Further curtailment of shipments is also reported by many sellers, and in some cases complete suspensions for the next two weeks have been placed in effect. Few foundries have enough iron coming to them on old contracts to enable them to operate well into January, but others, which are disposed to wait for a while before contracting for their first quarter needs, will have to place small supplementary tonnages in the next few weeks. In the meantime, furnaces are determined not to let their yard stocks increase, and additional stacks may be banked before the end of the week. This attitude gives the price situation more strength than it would have ordinarily in a period of such light demand, and the small tonnages of iron which are being sold from time to time are bringing the full quoted prices of \$18.50, Valley, for basic and foundry iron, and \$19 for Bessemer and malleable. These quotations will probably not be tested by any substantial tonnage until after the end of the year.

Prices per gross ton, f.o.b. Valley furnace:
Basic\$18.50
Bessemer19.00
Gray forge18.00
No. 2 foundry18.50
No. 3 foundry18.00
Malleable19.00
Low phos., copper free27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic\$19.00
No. 2 foundry19.00
No. 3 foundry18.50
Malleable19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel. — Shipments

are very light this month. Some makers are producing more than they are shipping. One or two of the larger mills in the district are said to be accumulating reserve stocks of semi-finished steel in anticipation of heavy rollings of other products, notably rails, in the next two months. However, this practice is economical only with Pennsylvania mills, and not with producers in Ohio and West Virginia, which must pay large year-end inventory taxes. From a sales standpoint, the semi-finished market is extremely dull, and price uncertainty continues. The market is nominally quotable at \$35, Pittsburgh or Youngstown, and some mills are still shipping against contracts made at this figure. However, this price is by no means established on first quarter business. On forging billets, the \$40, Pittsburgh, quotation is still made, and is applied to a small tonnage of first quarter business. However, this price ordinarily depends on the rerolling billet quotation, and contracts would probably be marked down in case billets declined. Wire rods are holding at \$40, Pittsburgh or Cleveland, and first quarter contracting is proceeding at a fair pace.

Bars, Shapes and Plates.—Business is still quiet, and specifications reaching mills largely call for immediate shipment. A fair tonnage, specified for early January delivery, is beginning to accumulate with some companies, but this business is not yet affecting operating rates in this district. Structural mills are running fairly well, and demand from fabricators, working on large jobs, is steady. The railroad car builders have called for little tonnage as yet on recent orders, but this business is certain to develop in January and continue for several months, if car builders' order books may be taken as an indication. Pittsburgh mills will soon figure on a postoffice at Baltimore, which will take about 4500 tons of shapes and at least 500 tons of reinforcing bars. A sewer job at Columbus, Ohio, will also require 300 tons of reinforcing steel. Otherwise the reinforcing bar business is seasonably dull. Barge awards are lacking, but prospective work continues to attract interest. The Standard Unit Navigation Co., which earlier in the fall announced its intention of buying 50 small barges, now expects

to buy 60, but there is little likelihood that this business will be placed before spring. The automobile industry is not yet placing orders for bars in this district in any considerable amount, although some small tonnages, apparently required for new models, are coming to local mills. Shipments to cold finishing mills are extremely light, but this may be due partly to continued effort to reduce inventories rather than to the exceptionally light demand for this product. However, the stocks of cold finishers are so low that replenishments in January are almost certain to bring out a considerable tonnage. Prices could hardly be expected to show much strength in such a quiet market, but bars, shapes and plates are still quotable at 1.90c., Pittsburgh, and there is no reason to believe that this figure is being shaded on occasional small lots which are being placed. It is possible that large buyers who might ordinarily enjoy an exceptionally low price are able to do even better in this market, but mills do not consider this business as indicative of generally reduced price levels.

Rails and Track Accessories.—Specifications for track accessories show little change in volume, but some makers are accumulating stocks this month in anticipation of heavy rush orders in January. The carriers may be expected to call for considerable tonnages in very short order, and, by stocking against this probability, it has been possible to keep mills operating at a better rate this month than is justified by the volume of current demand. The Baltimore & Ohio has come into the market for 15,000 kegs of spikes, but has not yet formally inquired for its annual rail requirements. Otherwise, new inquiry is very light, although some roads which buy quarterly are coming into the market for their usual tonnage.

Tubular Goods.—The pipe business is not exempt from the general stagnation in the steel business which has existed for several weeks, and lack of buying has resulted in further curtailment of mill operations. The pipe industry as a whole is not running at more than 50 per cent of theoretical capacity, and with some mills the figure is lower. Shipments to ware-

THE IRON AGE Composite Prices

Finished Steel

Dec. 17, 1929, 2.362c. a Lb.

One week ago.....	2.362c.
One month ago.....	2.362c.
One year ago.....	2.391c.
10-year pre-war average.....	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1929	2.412c., April 2:	2.362c., Oct. 29
1928	2.391c., Dec. 11:	2.314c., Jan. 3
1927	2.453c., Jan. 4:	2.293c., Oct. 25
1926	2.453c., Jan. 5:	2.403c., May 18
1925	2.560c., Jan. 6:	2.396c., Aug. 18

Pig Iron

Dec. 17, 1929, \$18.21 a Gross Ton

One week ago.....	\$18.29
One month ago.....	18.38
One year ago.....	18.46
10-year pre-war average.....	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1929	\$18.71, May 14:	\$18.21, Dec. 17
1928	18.59, Nov. 27:	17.04, July 24
1927	19.71, Jan. 4:	17.54, Nov. 1
1926	21.54, Jan. 5:	19.46, July 13
1925	22.50, Jan. 13:	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel	
	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
Del'd Philadelphia.....	2.22c.
Del'd New York.....	2.24c.
Del'd Cleveland.....	1.85c. to 1.90c.
F.o.b. Cleveland.....	1.85c. to 1.90c.
F.o.b. Lackawanna.....	2.00c.
F.o.b. Birmingham.....	2.10c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c.

Billet Steel Reinforcing	
F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	2.00c.
F.o.b. Pittsburgh mills, cut lengths.....	2.25c.
F.o.b. Birmingham, mill lengths.....	2.10c.

Rail Steel	
F.o.b. mills, east of Chicago dist.....	1.90c.
F.o.b. Chicago Heights mill.....	1.90c.
Del'd Philadelphia.....	2.27c.

Iron	
Common iron, f.o.b. Chicago.....	2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
Del'd Cleveland.....	2.09c.
Del'd Philadelphia.....	2.10c. to 2.15c.
F.o.b. Coatesville.....	2.00c. to 2.05c.
F.o.b. Sparrows Point.....	2.00c. to 2.05c.
F.o.b. Lackawanna.....	2.00c. to 2.05c.
Del'd New York.....	2.17 1/2 c. to 2.22 1/2 c.
C.i.f. Pacific ports.....	2.25c. to 2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
F.o.b. Lackawanna.....	2.00c. to 2.05c.
F.o.b. Bethlehem.....	2.00c.
Del'd Cleveland.....	2.09c.
Del'd Philadelphia.....	1.96c. to 2.06c.
Del'd New York.....	2.09 1/2 c. to 2.14 1/2 c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	2.00c.
Wider than 6 in., P'gh.....	1.90c.
6 in. and narrower, Chicago.....	2.10c.
Wider than 6 in., Chicago.....	2.00c.
Cooperage stock, P'gh.....	2.20c.
Cooperage stock, Chicago.....	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.20c.
Bars, f.o.b. Chicago.....	2.20c.
Bars, Cleveland.....	2.20c.
Bars, Buffalo.....	2.20c.
Shafting, ground, f.o.b. mill.....	*2.55c. to 3.50c.
Strips, P'gh.....	2.75c.
Strips, Cleveland.....	2.75c.
Strips, del'd Chicago.....	3.05c.
Strips, Worcester.....	2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
To Merchant Trade

	Base per Keg
Standard wire nails.....	\$2.40 to \$2.50
Cement coated nails.....	2.40 to 2.50
Galvanized nails.....	4.40 to 4.50

	Base per Lb.
Polished staples.....	2.85c. to 2.95c.
Galvanized staples.....	3.10c. to 3.20c.
Barbed wire, galvanized.....	3.05c. to 3.15c.
Annealed fence wire.....	2.55c. to 2.65c.
Galvanized wire, No. 9.....	3.00c. to 3.10c.
Woven wire fence (per net ton to retailers).....	\$65.00

To Manufacturing Trade
Bright hard wire, Nos. 6 to 9 gage..... 2.40c.
Spring wire..... 3.50c.

(Carload lots, f.o.b. Chicago.)
Wire nails..... \$2.45 to \$2.55 (keg)
Annealed fence wire..... 2.60c. to 2.70c. (lb.)
Bright hard wire to manufacturing trade..... 2.45c.
Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.....	\$2.70
Less carloads, Wheeling or Reading.....	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh.....	2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.30c.
No. 10, blue annealed, del'd Phila.....	2.42c. to 2.52c.
No. 10, blue annealed, B'ham.....	2.35c.

Sheets

Blue Annealed	
	Base per Lb.
No. 13, f.o.b. P'gh.....	2.35c.
No. 13, f.o.b. Chicago dist.....	2.45c.
No. 13, del'd Philadelphia.....	2.57c. to 2.67c.
No. 13, blue annealed, B'ham.....	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.75c.
No. 24, f.o.b. Chicago dist. mill.....	2.75c. to 2.85c.
No. 24, del'd Philadelphia.....	3.07c.
No. 24, f.o.b. Birmingham.....	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh.....	4.00c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	3.40c. to 3.50c.
No. 24, f.o.b. Chicago dist. mill.....	3.50c. to 3.60c.
No. 24, del'd Cleveland.....	3.59c. to 3.69c.
No. 24, del'd Philadelphia.....	3.72c. to 3.82c.
No. 24, f.o.b. Birmingham.....	3.65c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.00c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	3.90c. to 4.00c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.90c.
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Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills.....	\$5.35
Standard cokes, f.o.b. Gary.....	5.45

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.70 | 25-lb. coating I.C. \$15.90
15-lb. coating I.C. 13.40 | 30-lb. coating I.C. 16.80
20-lb. coating I.C. 14.60 | 40-lb. coating I.C. 18.80

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential
2000 (1 1/2% Nickel).....	\$0.25
2100 (1 1/4% Nickel).....	0.55
2300 (3/4% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bars.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flat).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	\$6.00
Light (from rail steel), f.o.b. mill.....	\$4.00
Light (from billets), f.o.b. Ch'go mill.....	\$6.00

Track Equipment

	Base per 100 Lb.
Spikes, 3/4 in. and larger.....	\$2.80
Spikes, 1/2 in. and smaller.....	2.80
Spikes, boat and barge.....	3.00
Tie plate, steel.....	2.15

Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld	
Inches	Steel Black Galv. Iron Black Galv.
1/4.....	45 19 1/2 1/4 and 3/8 +11 +86
1/2.....	51 25 1/2 1/2..... 23 5
3/4.....	55 42 1/2 3/4..... 28 11
1.....	60 48 1/2 1 and 1 1/4..... 31 15
1 to 3.....	62 50 1/2 1 1/2 and 2..... 35 18

Lap Weld	
2.....	55 43 1/2 2..... 28 9
2 1/2 to 6.....	59 47 1/2 2 1/2 to 3 1/2..... 28 12
7 and 8.....	56 43 1/2 4 to 6..... 30 17
9 and 10.....	54 42 1/2 7 and 8..... 29 16
11 and 12.....	53 40 1/2 9 to 12..... 26 11

Butt Weld, extra strong, plain ends	
1/4.....	41 24 1/2 1/4 and 3/8 +13 +48
1/2.....	47 30 1/2 1/2..... 23 7
3/4.....	53 42 1/2 3/4..... 28 12
1.....	58 47 1/2 1 to 2..... 34 15
1 to 1 1/2.....	60 49 1/2
2 to 3.....	61 50 1/2

Lap Weld, extra strong, plain ends	
2.....	53 42 1/2 1/4..... 29 12
2 1/2 to 4.....	57 46 1/2 2 1/2 to 4..... 34 20
4 1/2 to 6.....	56 45 1/2 4 1/2 to 6..... 33 19
7 to 8.....	52 39 1/2 7 and 8..... 31 17
9 and 10.....	45 32 1/2 9 to 12..... 21 8
11 and 12.....	44 31 1/2

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	
2 in. and 2 1/4 in.....	38
2 1/2 in.—2 3/4 in.....	46
3 in.....	52
3 1/4 in.—3 1/2 in.....	54
4 in.....	57
4 1/2 in. to 6 in.....	46
Charcoal Iron	
1 1/4 in.....	1
1 1/2 in.....	8
2 in.—2 1/4 in.....	13
2 1/2 in.—2 3/4 in.....	16
3 in.....	17
3 1/4 in. to 3 1/2 in.....	18
4 in.....	20
4 1/2 in.....	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:
Lap Welded Steel—Under 10,000 lb., 5 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.....	61
1 1/4 in.....	53
1 1/2 to 1 3/4 in.....	37
1 3/4 in.....	32
2 to 2 1/4 in.....	32
2 1/4 to 2 3/4 in.....	40
Hot Rolled	
2 and 2 1/4 in.....	38
2 1/2 and 2 3/4 in.....	46
3 in.....	52
3 1/4 to 3 1/2 in.....	54
4 in.....	57
4 1/2, 5 and 6 in.....	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	60
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

houses in the oil country are very light, although some tonnage is moving down the river to distributing points in the Mississippi Valley. The mechanical tubing business looks more promising, as a few automobile companies have entered specifications for January shipments and others are expected to follow in the next two weeks. Pipe prices are holding satisfactorily and the difficulties in maintaining resale quotations, encountered during the summer and early fall, have been largely ironed out.

Wire Products.—Makers of wire products have noticed little change in their business, which continues very slow. Jobbers are placing occasional rush orders for carload lots of nails and wire, indicating closely clipped inventories, but demand for manufacturers' wire is dull and the slight increase in the demands of automobile and auto parts makers is not yet contributing much to the total tonnage. Prices are holding, with nails at \$2.40 to \$2.50 a keg, Pittsburgh, and bright hard wire at 2.40c. a lb.

Sheets.—Some makers of sheets report a slight increase in business, and operations this week seem to be generally higher than they were in the first two weeks of the month. This is due partly to the fact that a number of mills are cleaning up all possible tonnage with the prospect of practically no operation Christmas week, and partly to the placing of rolling orders by automobile makers. Nearly all of this material is for rush shipment, although a fair amount of tonnage for shipment during January is now reaching company books. The leading interest operated its mills last week at about 60 per cent of theoretical capacity, with the independents at a somewhat lower rate and the industry as a whole at not above 50 per cent. Full finishing mills have been running at about 35 per cent, but this

will be improved this week. Prices are subject to strong pressure in the Detroit area, but in this immediate district they seem to be well established at 2.75c., Pittsburgh, for black sheets, 3.40c. to 3.50c. for galvanized, and 2.35c. and 2.20c., respectively, for blue annealed and light plates. The latter quotations apply only to the jobbing mill product, as wide strips are \$2 to \$4 a ton lower.

Tin Plate.—Tin plate mills are running at about the same rate as they did last week, when the leading interest operated at slightly above 80 per cent and the independents at 60 to 70 per cent. The smaller mills have not been so fortunate in securing anticipated tonnage to keep their mills busy at this time. Current specifications are light. A slight increase occurred at the end of the previous week when February tonnage is supposed to be specified.

Strip Steel.—Mill operations are slightly higher this week, but most of the mills in the district will not operate Christmas week, and the average for the month will be between 25 and 35 per cent of capacity. On the cold-rolled material, these figures will likely prove too high. Specifications from the automobile industry have increased slightly, although in most cases the tonnages are small, and it is evident that the motor car builders are not yet placing orders for heavy production. A good part of this business has come from the Ford Motor Co., which has planned a rather large January schedule, and which, so far as can be ascertained from the maze of conflicting reports in the Detroit territory, is not to be matched by other car builders. The hardware makers are taking a fair tonnage of strip steel, but demand from warehouses is small, and other consuming lines are equally cautious in their buying. Prices are none too strong, but not quotably lower. There is a belief on the part of some that a lower price on hot-rolled material may have been secured by one of the large automobile companies, but the majority of sellers are holding to 1.90c. and 2c., Pittsburgh, on this material. Cold-rolled strip is quoted at 2.75c., Pittsburgh or Cleveland, and subject to occasional shading. Small buyers of both hot and cold-rolled material have entered first quarter contracts at these figures.

Coal and Coke.—A few buyers of furnace coke are showing some interest in their requirements for the first two months of the new year. This may be prompted by their belief that prices may be no lower in January and possibly stronger, if curtailment of production continues. The \$2.65, Connellsville, price is still representative of the market, although lower prices are mentioned occasionally. Demand for heating coke is better than it has been, although not particularly good for this season of the year. The foundry grade is dull, with shipments low and new buying light.

Old Material.—The scrap market retains its recent strength, but the heavy melting grade is not quotably higher on the basis of actual sales. Late last week a substantial tonnage was sold to a local consumer at \$15.50, and dealers are meeting with difficulty in covering this order at a profit. It is fairly certain that no mill could duplicate this price on a large tonnage of scrap, but some of them are still making offers and would undoubtedly be willing to buy at the present figure for investment purposes. Hydraulic compressed sheets have also been sold during the week at \$15.50, and are now quotable on the same basis as steel. Other grades of scrap are quiet, and the market is very limited. Specialties continue strong.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel.	\$15.00 to \$15.50
No. 2 heavy melting steel.	13.00 to 13.50
Scrap rails	14.00 to 14.50
Compressed sheet steel.	15.00 to 15.50
Bundled sheets, sides and ends	14.00 to 14.50
Cast iron carwheels.	14.00 to 14.50
Sheet bar crops, ordinary.	17.00 to 17.50
Heavy breakable cast.	11.00 to 11.50
No. 2 railroad wrought.	15.00 to 15.50
Hvy. steel axle turnings.	14.50 to 15.00
Machine shop turnings.	10.00 to 10.50

Acid Open-Hearth Grades:

Railr. knuckles and couplers	19.50 to 20.50
Railr. coil and leaf springs	19.50 to 20.50
Roller steel wheels.	19.50 to 20.50
Low phos. billet and bloom	20.50 to 21.00
ends	20.50 to 21.00
Low phos., mill plates.	20.50 to 21.00
Low phos., light grades.	19.50 to 20.50
Low phos., sheet bar crops	20.50 to 21.00
Heavy steel axle turnings.	14.50 to 15.00

Electric Furnace Grades:

Low phos., punchings.	18.50 to 19.00
Hvy. steel axle turnings.	14.50 to 15.00

Blast Furnace Grades:

Short shoveling steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.50 to 11.00
Cast iron borings	10.50 to 11.00

Rolling Mill Grades:

Steel car axles.	19.50 to 20.50
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Cupola Grades:

No. 1 cast	14.00 to 15.00
Rails 3 ft. and under.	17.50 to 18.50

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes.	2.90c.
Reinforcing steel bars.	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles.	3.70c. to 3.80c.
Galv. sheets (No. 24), 25 or more bundles.	4.35c. to 4.45c.
Light plates, blue annealed (No. 10), 1 to 24 plates.	3.25c. to 3.35c.
Blue annealed sheets (No. 13), 1 to 24 sheets.	3.40c. to 3.50c.
Galv. corrug. sheets (No. 28), per square	\$4.33
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count.	60 per cent off list
Machine bolts, 100 count.	60 per cent off list
Carriage bolts, 100 count.	60 per cent off list
Nuts, all styles, 100 count.	60 per cent off list
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'l'd, base per 100 lb.	\$2.90 to 3.00
Wire, galv. soft, base per 100 lb.	2.90 to 3.00
Common wire nails, per keg.	2.80 to 2.90
Cement coated nails, per keg	2.95 to 3.05

Steel Corporation Files \$13,401,467 Tax Claim

The United States Steel Corporation filed a claim this week of \$13,401,467 in the United States Court of Claims, Washington. The Steel Corporation contends that this amount was erroneously collected by the Treasury as the company's liability for income and profit taxes for 1919, owing to faulty computation of capital by the commissioner of internal revenue.

That the use of steel or steel underframe cars in passenger-train service be required, subject to appropriate exceptions, is a renewed recommendation in the annual report of the Interstate Commerce Commission. Also it holds that the use in passenger trains of wooden cars between or in front of steel or steel underframe cars be prohibited.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms		Sheet Bars		Skelp	
Per Gross Ton		(Open Hearth or Bessemer)		(F.o.b. Pittsburgh or Youngstown)	
Rerolling, 4-in. and under 10-in., Pittsburgh	\$35.00	Pittsburgh	\$35.00	Grooved	1.85c. to 1.90c.
Rerolling, 4-in. and under 10-in., Youngstown	35.00	Youngstown	35.00	Universal	1.85c. to 1.90c.
Rerolling, 4-in. and under 10-in., Cleveland	34.00	Cleveland	34.00	Sheared	1.85c. to 1.90c.
Rerolling, 4-in. and under 10-in., Chicago	36.00	Slabs		Wire Rods	
Forging quality, Pittsburgh	40.00	(8 in. x 2 in. and under 10 in. x 10 in.)		(Common soft, base)	
		Pittsburgh	\$35.00	Pittsburgh	\$40.00
		Youngstown	35.00	Cleveland	40.00
		Cleveland	34.00	Chicago	41.00

Prices of Raw Material

Ores		Ferromanganese		Fluxes and Refractories	
Lake Superior Ores, Delivered Lower Lake Ports		Per Gross Ton		Fluorspar	
Old range Bessemer, 51.50% iron	\$4.80	Domestic, 80%, seaboard	\$100.00	Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
Old range non-Bessemer, 51.50% iron	4.65	Foreign, 80%, Atlantic or Gulf port, duty paid	100.00	No. 2 lump, Illinois and Kentucky mines	20.00
Mesabi Bessemer, 51.50% iron	4.65	Spiegeleisen		Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	\$18.25 to 18.75
Mesabi non-Bessemer, 51.50% iron	4.50	Per Gross Ton Furnace		Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/4% silica, f.o.b. Illinois and Kentucky mines	\$2.50
High phosphorus, 51.50% iron	4.40	Domestic, 19 to 21%	\$31.00 to \$34.00	Fire Clay Brick	
Foreign Ore, c.i.f. Philadelphia or Baltimore		Domestic, 16 to 19%	29.00 to 32.00	Per 1000 f.o.b. Works	
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.	Electric Ferrosilicon		High-Heat Duty Brick	Intermediate Heavy Duty Brick
Iron ore, low phos., Swedish, average 68% iron	12.00c.	Per Gross Ton Delivered		Pennsylvania	\$43.00 to \$46.00
Iron ore, basic Swedish, average 65% iron	10.00c.	50%	\$83.50	Maryland	43.00 to 46.00
Manganese ore, washed, 52% manganese, from the Caucasus	30.00c.	75%	130.00	New Jersey	50.00 to 65.00
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.	Per Gross Ton Furnace		Ohio	43.00 to 46.00
Tungsten ore, high grade, per unit, in 60% concentrates	\$15.50 to \$16.50	10%	\$35.00	Kentucky	43.00 to 46.00
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00	11%	37.00	Missouri	43.00 to 46.00
Molybdenum ore, 85% concentrates of MoS ₃ , delivered	50c. to 55c.	Bessemer Ferrosilicon		Illinois	43.00 to 46.00
Coke		F.o.b. Jackson County, Ohio, Furnace		Ground fire clay, per ton	7.00
Furnace, f.o.b. Connellsville prompt	\$2.65	Per Gross Ton		Silica Brick	
Foundry, f.o.b. Connellsville prompt	\$3.75 to 4.75	6%	\$22.00 to \$23.00	Per 1000 f.o.b. Works	
Foundry, by-product, Chgo ovens	8.00	7%	23.00 to 24.00	Pennsylvania	\$43.00
Foundry, by-product, New England, del'd	11.00	8%	24.00 to 25.00	Chicago	52.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40	9%	25.00 to 26.00	Birmingham	50.00
Foundry, by-product, Phila.	9.00	Other Ferroalloys		Silica clay, per ton	\$8.50 to 10.00
Foundry, Birmingham	5.00	Ferrotungsten, per lb. contained metal del'd	\$1.40 to \$1.50	Magnesite Brick	
Foundry, by-product, St. Louis, f.o.b. ovens	8.00	Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.	Per Net Ton	
Foundry by-prod., del'd St. Louis	9.00	Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65	Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Coal		Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00	Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75	Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00	Standard size	45.00
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75	Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50	Chrome Brick	
Gas coal, 1/4-in. f.o.b. Pa. mines	1.90 to 2.00	Mill Prices of Bolts, Nuts, Rivets and Set Screws		Per Net Ton	
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75	Bolts and Nuts		Standard size	
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.	Per 100 Pieces		Small Rivets	
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10	(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)		(1/2-in. and smaller)	

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts		Bolts and Nuts		Small Rivets	
Per 100 Pieces		Per Cent Off List		Per Cent Off List	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)		Semi-finished hexagon nuts, S.A.E.		F.o.b. Pittsburgh	
Per Cent Off List		Semi-finished hexagon castellated nuts, S.A.E.		F.o.b. Cleveland	
+Machine bolts	70	Stove bolts in packages, P'gh.		F.o.b. Chicago	
+Carriage bolts	70	Stove bolts in packages, Chicago.		Cap and Set Screws	
Lag bolts	70	Stove bolts in bulk, P'gh.		(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Plow bolts, Nos. 1, 2, 3 and 7 heads	70	Stove bolts in bulk, Chicago.		Per Cent Off List	
Hot-pressed nuts, blank or tapped, square	70	Stove bolts in bulk, Cleveland.		Milled cap screws	
Hot-pressed nuts, blank or tapped, hexagons	70	Tire bolts		Milled standard set screws, case hardened	
C.p.c. and t. square or hex. nuts, blank or tapped	70	Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.		80 and 5	
Washers*	70	Large Rivets		Milled headless set screws, cut thread	
		(1/2-in. and larger)		Upset hex. head cap screws, U.S.S. thread	
		Base per 100 Lb.		Upset hex. cap screws, S.A.E. thread	
		F.o.b. Pittsburgh or Cleveland		Upset set screws	
		F.o.b. Chicago		Milled studs	

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including 1/4 in. x 6 in. take 10 per cent lower list prices.

Chicago

Consumers Interest in Future Needs Growing But Current Steel Demand Is Light—Some Encouraging Factors

CHICAGO, Dec. 17.—Although sentiment in the Chicago iron and steel market is improved, demand for tonnage remains light. Interest in future needs is growing, as indicated by consumers' requests for prices. The total volume of contracts placed is smaller than that of last week, and spot buying, which is strongly under the influence of seasonal conditions, is receding.

However, several encouraging conditions exist. Structural awards and inquiries from a wide territory surrounding Chicago are noticeably larger. Farm implement manufacturers are maintaining a high rate of output of tillage machinery and are now releasing steel against production of harvesting equipment. Efforts by mills to drive in rail releases have been successful, and this tonnage, with specifications for other finished steel products permits ingot output to be held firmly at 65 per cent of capacity. Specifications for plates for pipe manufacture are larger and schedules point to heavier releases.

Closing of formal orders for the 5000 Rock Island cars has released about 75,000 tons of steel, some of which is already on rolling schedules. The Milwaukee road has entered formal requests for prices on 2300 cars and is preparing specifications on 750 stock cars.

Although pressure for lower prices is severe, most steel mill commodities are holding well at current quotations. Plates, shapes and bars are steady at 2c. a lb., Chicago. Some weakness is indicated in prices for nails at several points to the south of Chicago. Black sheets have been sold at \$2 a ton below the quotation of a week ago.

Pig Iron.—Until very recently, the daily volume of specifications for Northern pig iron has held above the average of the preceding month. However, in recent days releases have grown lighter under seasonal influences. It long has been the practice for most foundries to close down about one week in the holiday season and, from all appearances, this year will not be an exception. With all merchant stacks in this district lighted, producers are making a surplus of iron and are adding to stocks. Practices in buying have reversed in the week. A short time ago the bulk of sales were for nearby shipment. Lessened needs over the holiday season have brought a sharp recession in spot purchasing, but contracts for the first quarter are showing a marked increase. It is reported that a Southern furnace has named \$15 a ton, Birmingham, as the price for iron to be delivered in the South. No announcement has been made as to the course to be taken for Northern delivery.

Prices per gross ton at Chicago:
N'th'n No. 2 fdy., sil. 1.75 to 2.25...\$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75... 20.50
Malleable, not over 2.25 sil. 20.00
High phosphorus 20.00
Lake Super. charcoal, sil. 1.50 27.04
So'th'n No. 2 fdy. (all rail) \$19.01 to 19.51
Low phos., sil. 1 to 2, copper free... 29.50
Silvery, sil. 8 per cent...\$28.79 to 29.79
Bess. ferrosilicon, 14-15 per cent... 46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—This market is quiet. Most contracts for ferromanganese and 50 per cent ferrosilicon have been signed. The spiegeleisen market is dull, with car-lot orders far apart.

Rails and Track Supplies.—Local mills are meeting with success in pressing for releases of standard-section rails as a measure to support the current rate of ingot output. New orders this week total 5000 tons made up of two lots, one for a frog and switch manufacturer and the other for a small Western railroad. Both orders are for early rolling. Little actual inquiry is now before the trade. However, there is still a sizable tonnage to come into this market, the bulk of which is normally bought soon after the turn of the year. It is reported here that the New York Central may close this week for the 14,000 tons of track accessories it has on inquiry. Miscellaneous orders this week total 3000 tons, the bulk of which is for current needs.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. **Per lb.:** Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Cast Iron Pipe.—Outstanding among fresh inquiries in this market is 8000 tons of cast iron pipe, on which Milwaukee will close bids Dec. 24. Included in this request for prices is 500 tons of 6-in.; 3500 tons of 8-in.; 2500 tons of 12-in. and 1500 tons of 16-in.; also 500 tons of special castings, 100 tons Class D offset castings and 500 hydrants. Detroit, which has

an inquiry before the trade for large diameter pipe, is contemplating the purchase of several thousand tons of 6-in. and 8-in. pipe early in January. Several public utilities have taken preliminary figures on 1930 needs.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$43.70 to \$45.70; 4-in., \$47.70 to \$49.70; Class A and gas pipe, \$3 extra.

Structural Material.—In Chicago, this market remains inactive in actual awards but new contracts and fresh inquiry from surrounding territory show substantial increases. Among awards this week is 5500 tons for bridge work at Indianapolis. Steel has been placed for a power house in Nebraska, and several like inquiries, including a large tonnage at Waukegan, Ill., are active. A telephone exchange at San Antonio, Tex., calls for 3000 tons of steel.

Mill prices on plain material, per lb.: 2.00c. base, Chicago.

Sheets.—Hot mill output in this district is holding at 50 per cent of capacity. The bulk of current business is in carload lots for immediate delivery. Producers are of the opinion that stocks in the hands of users are near the vanishing point. Jobbers are thinking more of the inventory period and have made sharp cuts in the tonnages which they are taking from mills. There is some interest in future needs, which is shown more in requests for prices than in signed contracts. Prices, delivered Chicago, for galvanized sheets are well-established at 3.55c. to 3.65c. a lb., and for blue annealed sheets, 2.35c. Quotations on black sheets are giving ground, and the range is now 2.80c. to 2.90c. For the first time in many months, shipments of galvanized sheets are in larger volume than those of blue annealed. This is explained by the fact that light manufacturers who use blue annealed sheets are cutting orders to match dullness in their activities, whereas distribution of galvanized sheets is in steady volume from lumber yards, hardware retailers and numerous like agencies. Galvanized roofing may be had from stock. Other sheet mill products can be shipped in one to two weeks.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.80c. to 2.90c.; No. 24 galv., 3.55c. to 3.65c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Wire Products.—Producers of wire and wire products report a substantial increase in forward contracts, though the bulk of this tonnage is for wire ropes. Use of wire by the manufacturing trade has increased only in small degree in the last week. In the same period distribution by jobbers has lightened in the part of the country where cold weather has put an end to outdoor work. Additional tonnage taken for the manufacture of new automobile models is practically negligible. Shipments of electrical cables are large, and order books are well filled. New business is brisk, and producers of this commodity fore-

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel..	1.95c. to 2.10c.
Reinforc'g bars, rail steel.....	1.80c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Plats and squares.....	4.10c.
Bands (¾ in. in Nos. 10 and 12 gages).....	3.20c.
Hoops (No. 14 gage and lighter)..	3.75c.
Black sheets (No. 24).....	4.05c.
Galv. sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes, ¾ in. and larger.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, sq., tap. or blank..	60
Hot-pressed nuts, hex., tap. or blank..	60
No. 8 black ann'l'd wire, per 100 lb..	\$3.45
Com. wire nails, base per keg.....	\$2.75 to 2.95
Cement c't'd nails, base per keg.....	2.75 to 2.95

see an active year ahead, as gaged by expansion programs being announced by public utility operating companies.

Cold-Rolled Strip.—Consumers are showing more interest in forward needs. Prices are well established at 2.75c., Cleveland, or 3.05c. delivered Chicago. Shipments show moderate improvement because of slightly larger use by manufacturers of automobiles.

Reinforcing Bars.—Demand for reinforcing bars is practically nil. Prices continue low and, in the absence of attractive projects, dealers are inclined to give more attention to quoting slightly higher base prices for billet steel reinforcing bars out of warehouses. However, no improvement is shown in their willingness to cut extras for design, bending and the like. Prospects for the near future are uncertain. New projects before the trade are few in number and of small aggregate tonnage. Architects are dusting off some old plans for which they now hope money will be available. A moderate amount of road work is coming to dealers from Iowa and Minnesota. Bar bending shops are cutting deeply into backlogs at operating schedules which are lower than a week ago.

Bars.—The soft steel bar market is making a better showing. Specifications in the week are practically double the volume of the previous seven days, and therefore are measurably ahead of shipments. Sales, however, are in moderate volume. The fact that stocks are being held to a low point leads to the conclusion that expansion in releases is a measuring stick of an increase in the rate of consumption. Orders from manufacturers of farm machinery show that a high rate of output is being maintained in tillage machinery departments, and programs now being prepared indicate that the manufacture of harvesting machines will soon be under way. Mild steel bars may be had in seven to 14 days, depending on rolling schedules. Prices are well established at 2c., Chicago. Operations at rail steel bar mills are steady, and current specifications are ample to support this rate. Manufacturers of beds and barn equipment, though ordering frequently and in small lots, are taking quantities that in the aggregate are larger than is customary at this time of the year. Forward buying of fence posts for delivery in the spring is in moderate volume.

Plates.—Encouraging features of the local plate market are larger releases for pipe manufacture, which promise to expand still further in the near future, and the fact that the orders for the Rock Island cars have been formally placed and specifications for the steel are reaching mills. The Burlington Railroad is still undecided whether it will buy 1200 cars or build them in its own shops. It is reported that action on this question may be taken this week. A Texas

refiner has placed 1200 tons of tank plates, which will be fabricated in the Southwest. Fresh inquiry for similar work remains light. Deliveries of plates range from one to three weeks, with several universal mills making the most deferred promises.

Bolts, Nuts and Rivets.—Sharp reductions in specifications for these commodities are attributed by the trade to seasonal influences. Farm implement manufacturers are arranging schedules for the production of harvesting equipment. Forward contracting is near an end.

Coke.—Shipments of by-product foundry coke remain at a level slightly higher than the average in November. All ovens in this district are lighted. Forward contracting continues at \$8 a ton, local ovens.

Old Material.—The Chicago scrap iron and steel market continues to show added strength, as reflected by the feeling among dealers. There is still a strong urge to complete old orders as fast as possible, and this leads to spirited bidding for available tonnages, with higher prices being paid by brokers. On this score, numerous transactions are turning to losses on dealers' books. Large consumers are standing by, evidently being well satisfied with their stocks and tonnages that are being received from day to day. Some small melters are in need of scrap for business in hand. Inquiry from this source is active, and a few tonnages have been ordered at prices that are higher than those of a week ago. With the first of the year only two weeks away, some users are now making purchases on which they are specifying delivery in the first week in January. The market for brake shoes is more active, with supplies well matched with current demand. This situation is leading to some confusion, as users, after placing orders with dealers, enter the open market and bid against these dealers for available supplies. Consumers' transactions in heavy melting steel are lacking, but this grade is being turned over in large tonnages on dealer trades. The firmer tone in the market is explained by such factors as curtailment of gathering and preparation due to winter weather, deal-

ers' unwillingness to prepare scrap at current low prices, the slowness of scrap production because of the reduced volume of manufacturing, and closer selection, which results from careful inspection by several major consumers.

Prices deliv'd Chicago district consumers:
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$12.50 to \$13.00
Shoveling steel	12.50 to 13.00
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.00 to 11.50
Drop forge flashings.....	9.75 to 10.25
No. 1 busheling	11.00 to 11.50
Forg'd cast and r'd steel carwheels	17.50 to 18.00
Railroad tires, charg. box size	17.50 to 18.00
Railroad leaf springs cut apart	17.50 to 18.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	16.00 to 16.50
Coil springs	17.75 to 18.25
Electric Furnace Grades:	
Axle turnings	12.75 to 13.25
Low phos. punchings.....	15.00 to 15.50
Low phos. plates, 12 in. and under	15.00 to 15.50
Blast Furnace Grades:	
Axle turnings	10.50 to 11.00
Cast iron borings.....	9.25 to 9.75
Short shoveling turnings..	9.25 to 9.75
Machine shop turnings....	7.00 to 7.50
Rolling Mill Grades:	
Iron rails	14.50 to 15.00
Rerolling rails	14.50 to 15.00
Cupola Grades:	
Steel rails less than 3 ft..	16.25 to 17.25
Steel rails less than 2 ft..	18.50 to 19.00
Angle bars, steel.....	15.25 to 15.75
Cast iron carwheels	13.50 to 14.00
Malleable Grades:	
Railroad	16.00 to 16.50
Agricultural	14.50 to 15.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms	17.50 to 18.00
Iron car axles.....	25.50 to 26.00
Steel car axles	15.50 to 16.00
No. 1 railroad wrought...	12.00 to 12.50
No. 2 railroad wrought...	11.00 to 11.50
No. 1 busheling.....	9.00 to 9.50
No. 2 busheling.....	7.00 to 7.50
Locomotive tires, smooth.	14.50 to 15.00
Pipes and flues.....	9.50 to 10.00
Cupola Grades:	
No. 1 machinery cast.....	13.50 to 14.00
No. 1 railroad cast.....	12.50 to 13.00
No. 1 agricultural cast...	12.00 to 12.50
Stove plate	10.50 to 11.00
Grate bars	10.75 to 11.25
Brake shoes	10.25 to 10.75

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Employment and Payroll Totals in Identical Plants in October and September (a)

	Establishments	Number on Payroll		Weekly Payroll (b)	
		October	September	October	September
Iron and steel.....	208	278,896	256,029	\$9,049	\$9,277
Foundry and machine shop..	1,080	287,618	290,351	8,955	8,843
Machine tools.....	154	42,774	42,464	1,408	1,283
Hardware makers.....	72	32,503	32,566	844	837
Steam and hot-water appliances	112	33,379	32,587	1,018	961
Stoves	119	22,240	21,549	671	613
Structural ironwork.....	172	30,055	30,296	941	932
Cast iron pipe.....	39	11,635	11,999	273	283
Automobiles	222	393,297	438,928	12,980	14,449
Agricultural implements....	87	28,162	27,929	830	795

(a) United States Bureau of Labor Statistics.
(b) Thousands of dollars.

New York

Pig Iron Sales, at 10,000 Tons, Indicate Urgent Needs as Buyers Are Still Cautious

NEW YORK, Dec. 17.—The pig iron market has an improved tone. Caution still dominates the policy of melters and, with a price incentive lacking, there is nothing resembling a general first quarter buying movement. Despite these facts, the amount of business being booked by sellers is increasing, indicating that foundry stocks are scraping bottom and that new metal is required to fill castings contracts. Most orders are for relatively small lots and until recently many were for prompt shipment, although, with the approach of the year-end shutdown for inventory-taking, purchases for next year now predominate. Considering the character of the buying, sales in this district for the week, at more than 10,000 tons, were impressive. With the completion of inventories, foundry purchases are expected to show further improvement, even if orders are still mainly confined to nearby requirements. In fact, a less conservative attitude on the part of both buyers of castings and melters will be in order. The price situation shows little change and, while it is possible that attractive inquiries might bring out further concessions, the trade is aware that blast furnace stocks have not been permitted to pile up and that curtailment of pig iron production has been drastic. Buffalo foundry iron is available at \$17 to \$17.50, base furnace, and Southern is still quoted at \$13.50 to \$14, base Birmingham. Alabama producers have raised quotations in the Birmingham district to \$15, furnace, an advance of 50c. a ton, but so far as can be learned no change in prices for Northern deliveries is contemplated. The Worthington Pump & Machinery Corporation is in the market for 750 tons for first quarter delivery at its Holyoke, Mass., and Elmwood Place, Ohio, plants.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil.	1.75 to 2.25	\$21.91 to \$22.41
*Buff. No. 2, del'd east.		
N. J.	20.28 to 20.78	
East. Pa. No. 2 fdy., sil.	1.75 to 2.25	19.89 to 21.02
East. Pa. No. 2X fdy., sil.	2.25 to 2.75	20.39 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Finished Steel.—Steel orders have dropped to the lowest point since the decline in buying set in. Moreover, most of the orders of the past week were not only small in tonnage, but in most instances shipment after Jan. 1 was specified. Locally, the structural steel market is the most active of all steel departments. About 20,000 tons of new work was added to the pending list during the week. Revised figures on the Empire State Building call for 52,000 tons of steel,

and award of this project is expected shortly. New York district structural fabricators, having taken a large volume of work in October and November, have backlogs that will keep them busy for periods ranging from three to five months. Prices on finished steel products are fairly steady.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c.; plates, 2.17½c. to 2.22½c.; structural shapes, 2.09½c. to 2.14½c.; bar iron, 2.14c.

Warehouse Business.—The larger jobbers have had a slight increase in business in the past week, but among the smaller warehouses buying is still rather limited. Despite the advanced season, there is still some demand for structural steel, especially bar-sized shapes. Although black and galvanized sheets are moderately active, occasional concessions have appeared recently on desirable tonnages.

Cast Iron Pipe.—The United Gas Improvement Co., Philadelphia, is in the market for about 7000 tons of gas pipe, which it intends to purchase this year. The New York Power & Light Corporation, Albany, N. Y., is inquiring for 1500 tons of 4-in. to 24-in. gas pipe. The Federal Water Supply Co., New York, has closed on 1700 tons of 30-in. Class B pipe for Youngstown and Girard, Ohio, with the leading producer and on 750 tons of 18-in. and 24-in. pipe for Salem, Ore., with a Birmingham maker. The Portland Water District, Portland, Me., is about to close on 900 tons of pipe. Manchester, N. H., will open bids Dec. 23 on 750 tons of water pipe and fittings for delivery in the first quarter.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$34.60 to \$36.60; 4-in. and 5-in., \$37.60 to \$39.60; 3-in., \$44.60 to \$46.60. Class A and gas pipe \$3 extra.

Coke.—Shipments on contracts are continuing in most cases without requests for delay, but buying for prompt delivery is light. The coke operation at Swedeland, Pa., which recently began to make foundry grade, is quoting \$7.50 a net ton, ovens, the price maintained by the Philadelphia producer. Special brands of beehive coke are unchanged at \$4.85 a net ton, ovens, or \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$9.41. to New York and Brooklyn. Standard furnace coke is quiet at \$2.65 to \$2.75 a net ton. By-product coke is quoted at \$9 to \$9.40 a net ton, Newark or Jersey City, and \$10.06, New York or Brooklyn.

Ferroalloys.—Sellers of ferromanganese, particularly domestic producers, have closed requirement contracts for 1930 with most of their customers. The new price of \$100, seaboard, a reduction of \$5 a ton from the 1929 quotation, has been well received.

Practically all buyers of 50 per cent ferrosilicon have also contracted for their 1930 needs.

Reinforcing Bars.—Business has slowed down somewhat on account of the usual year-end lull, although the number of small lettings has been fair. Several important projects are pending, but action probably will be

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.50c.
Flats and squares.....	4.00c.
Cold-roll. strip, soft and quarter	
hard.....	5.15c. to 5.40c.
Hoops.....	4.25c.
Bands.....	3.75c.
Blue ann'd sheets (No. 10).....	3.25c. to 3.90c.
Long terme sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger... 3.40c.	
Smooth finish, 1 to 2½ x ¼ in.	
and larger.....	3.75c.
Open-hearth spring steel, bases,	
4.50c. to 7.00c.	
Machine bolts, cut threads:	Per Cent Off List
¾ x 6 in. and smaller.....	.60
1 x 30 in. and smaller.....	.50 to 50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	.60
¾ x 20 in. and smaller.....	.50 to 50 and 10
Coach Screws:	
¾ x 6 in. and smaller.....	.60
1 x 6 in. and smaller.....	.50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt.....	46	29
¾-in. butt.....	51	37
1-3-in. butt.....	53	39
2½-6-in. lap.....	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12
Wrought Iron—		
½-in. butt.....	5	+19
¾-in. butt.....	11	+9
1-1½-in. butt.....	14	+6
2-in. lap.....	5	+14
3-6-in. lap.....	11	+6
7-12-in. lap.....	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box...	\$6.45	\$6.20
Charcoal, per Box—	A	AAA
IC.....	\$9.70	\$12.10
IX.....	12.00	14.25
IXX.....	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R.

	Per Lb.
Nos. 18 to 20.....	3.70c.
No. 22.....	3.85c.
No. 24.....	3.90c.
No. 26.....	4.00c.
No. 28*.....	4.15c.
No. 30.....	4.40c.

Sheets, Galvanized

	Per Lb.
No. 14.....	4.15c.
No. 16.....	4.00c.
No. 18.....	4.15c.
No. 20.....	4.25c.
No. 22.....	4.35c.
No. 24.....	4.50c.
No. 26.....	4.75c.
No. 28*.....	5.00c.
No. 30.....	5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb

postponed until January in most cases. Prices are firm at 2.05c., New York.

Old Material.—Buying prices still show a tendency to decline. No. 1 heavy melting steel is being bought at \$14 a ton, delivered eastern Pennsylvania. The consumer at Claymount, Del., which has not been accepting deliveries of heavy melting steel for some weeks, is now receiving shipments on old orders. No. 2 heavy melting steel is inactive, and brokers are paying \$11 to \$11.25 a ton, delivered Pottsville, Pa., and \$11.50 a ton, delivered Phoenixville, Pa. Most grades of railroad scrap are off about 50c. a ton, on the basis of recent small tonnage sales by brokers and by the railroads.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$10.50 to \$11.35
Heavy melting steel (yard)	7.50 to 8.00
No. 1 hvy. breakable cast	9.50 to 10.50
Stove plate (steel works)	8.00
Locomotive grate bars	8.25
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.25 to 7.50
Cast borings (blast fur. or steel works)	7.00 to 7.50
Mixed borings and turnings	6.75 to 7.50
Steel car axles	15.25 to 16.25
Iron car axles	20.50 to 21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.25 to 9.75
Forge fire	8.50 to 9.00
No. 1 railroad wrought	11.50 to 12.50
No. 1 yard wrought, long	10.50 to 11.50
Rails for rolling	10.50 to 11.00
Stove plate (foundry)	8.25 to 8.50
Malleable cast (railroad)	12.50 to 13.00
Cast borings (chemical)	8.50 to 9.50
<i>Prices per gross ton, deliv'd local foundries:</i>	
No. 1 machry. cast	\$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

Non-Ferrous Ingot Metal Prices and Orders

CHICAGO, Dec. 14.—The Non-Ferrous Ingot Metal Institute reports average prices per pound received by its membership on commercial grades of the six principal mixtures of ingot brass during the 28-day period ended Dec. 6 as follows:

Commercial 80-10-10 (1 per cent impurities)	16.652c.
Commercial 78 per cent metal	14.783c.
Commercial 81 per cent metal	15.239c.
Commercial 83 per cent metal	15.368c.
Commercial 85-5-5-5	15.629c.
Commercial No. 1 yellow brass ingot	12.433c.

As there are, as yet, no generally accepted specifications for ingot brass, it must be understood that each item listed is a compilation representing numerous sales of metal known to the trade by the designation shown; but each item, in reality, includes many variations in formulas. Until the program of standardizing the principal specifications, now progressing in cooperation with the American Society for Testing Materials, is completed, the specifications will be understood to refer to "commercial grades."

Unfilled orders Dec. 1 for brass and bronze ingots and billets, on the books of members of the Non-Ferrous Ingot Metal Institute, amounted to 10,696 net tons.

Cleveland

Moderate Gain in Orders from Automobile Industry—Northern Ohio Mills Increase Ingot Output

CLEVELAND, Dec. 17.—While there has been little change in the volume of steel business during the past week, the improved sentiment is being maintained, and whatever tendency has developed has been toward an improvement. This has been more noticeable in steel bars, both in carbon and alloy steel, than in other products. Some good specifications came from the bolt, nut and rivet manufacturers and from makers of automotive parts. An Ohio manufacturer of automotive equipment purchased approximately 5000 tons of steel bars.

There is a moderate gain in orders from the automotive industry in the Detroit territory, but none of the motor car manufacturers is making extended commitments.

Manufacturers of lower-priced cars evidently are getting in production more rapidly than those making the higher-priced models. The Ford Motor Co. is understood to have a daily schedule of 4500 cars this week, a gain of 700. While unsold stocks of cars have been materially reduced, they are still large enough to cause some manufacturers to keep production down to a low point.

Ingot output by two of the larger independent mills in northern Ohio has increased considerably, these operating now at approximately 60 per cent of capacity.

The only development in the price situation is a reduction of \$1 a ton on sheet bars, billets and slabs.

Pig Iron.—Sales declined the past week, during which Cleveland interests sold 9500 tons of foundry and malleable iron. While most of the business was for the first quarter, there were a large number of small prompt shipment orders from foundries that are buying from hand-to-mouth. Foundries in the automotive field are staying out of the market, practically all the contracts placed coming from other industries. The General Electric Co. is inquiring for 300 tons of iron for its Erie works. The Westinghouse Electric & Mfg. Co. has not yet closed against its inquiry for iron for its Cleveland plant for the first quarter. Prices are unchanged and appear firm at \$18.50, Cleveland, for out-of-town shipment, \$19, furnace, for Cleveland delivery and \$19.50 to \$20, furnace, for shipment in Michigan. Shipping orders continue light and are not expected to show a gain during the remainder of the month. Two or three foundries in the automotive field that have not been taking iron issued releases during the week. However, there is no general improvement in shipping orders from this source. Most merchant furnaces are adding to their stock piles. The Central Alloy Steel Corporation has blown out its Massillon furnace for relining.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., sil. 1.75 to 2.25	\$19.51 to 20.51
Malleable	19.50
Ohio silvery, 8 per cent	28.00
Basic Valley furnace	18.50
Stand. low phos., Valley	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Fluorspar.—The present \$18 price on gravel fluorspar has been reestablished for next year, but, with restricted operations, mills are showing no interest in contracts.

Semi-Finished Steel.—The leading local maker of semi-finished steel has opened its books for the first quarter at \$34, Cleveland, Youngstown and Pittsburgh, for sheet bars, billets and slabs and has taken some contracts at this price, which is a \$1 a ton reduction from its fourth quarter price. However, the market had shown weakness recently. Youngstown mills are also naming \$34 for the first quarter. Wire rods are holding to \$40, Cleveland, but not many buyers have closed contracts. A Cleveland mill that slowed down operations to two open-hearth furnaces now has seven furnaces in operation.

Sheets.—Stamping plants are now receiving considerable inquiry from automobile manufacturers for car stampings and have asked mills for prices on sheets for estimating purposes. Releases against tonnages held up several weeks ago have increased, and some of the mills are operating better than they were last month. Independent mills in this territory are running at about 40 per cent of capacity. Current orders continue rather light. Automobile manufacturers are buying only in small lots and are not interested in covering for extended requirements. There is quite an improvement in releases from barrel manufacturers. There is little change in the price situation. Black sheets are fairly firm at 2.75c., Pittsburgh, but shading from regular quotations

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to 14 in. inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.60c. to 4.75c.
Blue ann'd sheets (No. 10)	3.25c.
No. 9 ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.65

*Net base, including boxing and cutting to length.

is reported on blue annealed sheets. While some of the continuous mills are naming 2.10c. for No. 10 and 2.25c. for No. 13, these prices are subject to concessions. On galvanized sheets, 3.40c. is a rather common quotation, and some first quarter business has been taken at that price.

Cold-Finished Steel Bars.—While a few consumers making automobile parts are operating a little better than recently, specifications have not increased. The market is firm at 2.20c., Cleveland. Very few contracts have been taken for the first quarter.

Bars, Plates and Shapes.—Specifications for steel bars gained during the week. Plates and structural shapes continue dull. Quite a few first quarter contracts were closed, these being at 1.90c., Cleveland, for steel bars and at 1.90c., Pittsburgh, for plates and shapes. While a 1.85c., Cleveland, price is still in evidence on steel bars, several of the outside mills will not meet this price. Specifications for alloy steel bars have increased, although some forge shops doing automobile work still have good stocks. Some first quarter contracts for alloy steel bars have been taken. Inquiry in the building field is light, and not much activity is expected during the remainder of the year.

Bolts, Nuts and Rivets.—Quite a few buyers have placed contracts for the first quarter since the reestablishment of the present 70 per cent discount. Specifications continue very light. As a result of the recent decline in the demand makers have considerable business on their books that will be cancelled at the end of the year.

Strip Steel.—While specifications for hot and cold-rolled strip are still rather light, orders are coming out in somewhat better volume than during the latter part of November. Most of the business is in specifications against outstanding contracts and consumers are ordering only for immediate needs. Prices on hot-rolled strip appear to be holding fairly

well, but new orders are not for sufficient tonnage to test prices. Cold-rolled strip appears firm at 2.75c., Cleveland, efforts to secure a lower price on car lots having proved unsuccessful.

Coke.—The output of domestic coke has been increased following the blowing out of blast furnaces. The demand for heating coke has declined, however, because of the mild weather. While egg coke is quoted at \$4.75, Ohio ovens, some price irregularity has developed. Foundry coke is very quiet and prices are unchanged. Ohio by-product foundry coke is quoted at \$8.25, ovens.

Old Material.—The market has improved to the extent that mills in the Youngstown district, which for a time took practically no scrap, have released some shipping orders for heavy melting steel and compressed sheet steel. One Cleveland mill is still taking blast furnace scrap. As dealers are well covered, the additional releases have not stimulated buying by them to any extent. The market is weak, and prices on most

of the steel-making grades have declined 50c. a ton. Little, if any, buying by mills is expected before January.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.	\$14.00 to \$14.50
No. 2 heavy melting steel.	13.00 to 13.50
Compressed sheet steel.	12.50 to 13.00
Light bundled sheet	
stampings	11.50 to 12.00
Drop forge flashings.	11.50 to 12.00
Machine shop turnings.	9.00 to 9.50
Short shoveling turnings.	11.00 to 11.50
No. 1 railroad wrought.	13.00 to 13.50
No. 2 railroad wrought.	14.00 to 14.50
No. 1 busheling.	12.00 to 12.50
Pipes and flues.	9.00 to 9.50
Steel axle turnings.	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops.	17.75 to 18.00
Low phos., billet, bloom and slab crops.	18.50 to 18.75
Low phos., sheet bar crops.	18.00 to 18.50
Low phos., plate scrap.	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings.	10.00 to 10.50
Mixed borings and short turnings.	10.00 to 10.50
No. 2 busheling.	10.00 to 10.50
Cupola Grades:	
No. 1 cast.	16.00 to 16.50
Railroad grate bars.	11.00 to 12.00
Stove plate.	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Railroad malleable.	18.00 to 18.50
Rails for rolling.	16.25 to 16.50

Philadelphia

Shape and Black Sheet Prices Weaker — Concessions of 50c. to \$1 a Ton on Pig Iron

PHILADELPHIA, Dec. 17.—Steel mill operations have receded to the lowest level of the year, and with the fourth quarter drawing to a close, new business is decidedly small. The shape market is inactive and prices have developed a further downward tendency, with recent sales of desirable tonnages at 1.85c. a lb., f.o.b. mill. Black sheet prices are also lacking in firmness when business is for prompt shipment. Automobile manufacturers have been increasing operations and railroad car buying has brought a substantial volume of activity to forging shops on axles and carwheels.

Shipbuilders are bidding on 10 steel barges for the New York, New Haven & Hartford Railroad, and are expecting award early next year of five steel tugboats for the Erie Railroad and two large passenger liners for the Export Steamship Corporation. Award of two large vessels for the United States Lines is delayed pending decision on the recommendation of the shipbuilder that the liners should be built with greater beam than is specified. Shipyards in this district are all well occupied, and one large builder has sufficient business for operation into the fall of 1930.

Pig Iron.—Foundry iron is still nominally quoted at \$21 a ton, furnace, but concessions of 50c. a ton are being increasingly offered, and recently reductions of \$1 a ton have been granted. Consumers show little interest in contracting for first quarter, evidently preferring to cover their requirements a carload at a time. The York Ice Machinery Co., York, Pa., has closed on a small tonnage of foundry iron; the American Engineering Co., Philadelphia, has purchased a carload of foundry and the Newport News Shipbuilding & Dry Dock Co., a carload of Virginia iron. The American Locomotive Co. has purchased 1000 tons of low phosphorus from an eastern Pennsylvania furnace. Southern iron is still a competitor for tonnage in this district, with sellers quoting \$13.50 and \$14 a ton, Birmingham district furnace, or \$18.50 to \$19 a ton, f.o.b. Philadelphia, rail-and-water

delivery. Birmingham furnaces are reported to have about 300,000 tons of iron piled, and, with the recent make in excess of sales, are adding to this total.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.76 to \$21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26 to 22.26
East. Pa. No. 1X.	21.72 to 22.76
Basic (del'd east. Pa.)	19.50 to 19.75
Gray forge	20.00 to 20.50
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. br'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Bars.—In certain instances, consumers have entered into first quarter contracts at 1.90c., Pittsburgh, or 2.22c., delivered Philadelphia, but

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier.	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel planished.	4.30c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats.	4.00c.
Steel hoops	3.55c.
Steel bands, No. 12 to ⅝-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.90c.
*Galvanized sheets (No. 24)	4.65c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

most users are not inclined to make future commitments, preferring to buy small lots of bars as they are needed.

Reinforcing Bars.—The only sizable project in the district at present, 900 tons of bars in the Convention Hall, Philadelphia, has been provisionally awarded to the Concrete Steel Co., pending award of the general contract. Prices show no improvement, with billet steel bars quoted at 1.90c. to 1.95c., Pittsburgh, or 2.22c. to 2.27c., delivered Philadelphia, and the extra for cutting to length usually omitted. Rail steel bars are 1.80c. to 1.95c., Franklin, Pa., and Tonawanda, N. Y., or 2.12c. to 2.27c., delivered Philadelphia.

Shapes.—New business is limited, and prices have shown a tendency to decline further. On substantial tonnages, mills have quoted 1.85c. a lb., f.o.b. nearest mill to consumer, or 1.91c., delivered Philadelphia, but small lots are still bringing 1.90c. to 1.95c., f.o.b. mill, or 1.96c. to 2.01c., delivered Philadelphia. The larger fabricating shops continue well engaged, but small fabricators are in need of tonnage. The Convention Hall, Philadelphia, requiring 7000 tons, has been provisionally awarded to the Bethlehem Steel Co., pending award of the general contract.

Plates.—Mills are maintaining a fair rate of operation and quoting 2c. a lb., Coatesville, Pa., both for prompt shipment and on first quarter contracts. Local shipbuilders are asking for some substantial plate tonnages, including material for 10 steel barges to be built for the New York, New Haven & Hartford Railroad.

Sheets.—Automobile manufacturers in this district are beginning to increase operating rates, but have not been heavy buyers of sheets. One automobile body builder is executing a contract with the Ford Motor Co., but has been receiving material from the Ford company instead of buying it direct. Blue annealed sheets are still quoted at 2.35c. a lb., Pittsburgh, or 2.67c., delivered Philadelphia, and blue annealed plates at 2.20c., Pittsburgh, or 2.52c., Philadelphia, with \$2 to \$4 concessions to automobile body builders and other preferred buyers. Black sheets are being maintained at 2.75c. a lb., Pittsburgh, or 3.07c., Philadelphia, for first quarter contracts, but on small tonnages for early shipment buyers claim to have obtained 2.65c. a lb., Pittsburgh, or 2.97c., Philadelphia. Galvanized sheets are quiet, and the price continues at 3.40c., Pittsburgh, or 3.72c., Philadelphia.

Imports.—In the week ended Dec. 14, 479 tons of chrome ore arrived at this port from Greece and five tons of manganese ore from Germany. Pig iron arrivals consisted of 4002 tons from the United Kingdom and 74 tons from the Netherlands. Only 37 tons of structural shapes was received from Belgium and three tons of steel scrap from the United Kingdom.

Old Material.—A Claymont, Del.,

user of No. 1 heavy melting steel has closed on about 5000 tons at \$14.50 a ton, delivered, and a Pencoyd, Pa., mill has purchased a small lot of No. 2 heavy melting steel at \$12.50 a ton, delivered, 50c. lower than a previous purchase of the same grade. Consumer buying is limited, and the trend of prices is still downward.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.	\$14.50
Scrap T rails.	14.00
No. 2 heavy melting steel.	\$12.00 to 12.50
No. 1 railroad wrought.	15.50 to 16.00
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	13.50
Hydraulic compressed, old.	12.00 to 12.50
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equiv.)	12.50 to 13.50
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	13.50 to 14.00
Railroad grate bars.	11.00 to 11.50
Stove plate (for steel works)	11.00 to 11.50
No. 1 low phos. hvy.	21.00 to 22.00
0.04% and under.	19.00 to 19.50
Couplers and knuckles.	19.00 to 19.50
Rolled steel wheels.	15.50 to 15.75
No. 1 blast furnace scrap.	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific.)	14.00
Shafting.	19.00
Steel axles.	20.00 to 21.00
No. 1 forge fire.	13.00 to 13.50
Cast iron carwheels.	15.50 to 15.75
No. 1 cast.	15.00 to 15.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling.	15.50 to 16.00

Research Fellowships at Michigan Mining College

Twelve fellowships, each carrying a stipend of \$1,200 with the usual exemption from fees, are to be offered by the Michigan College of Mining and Technology, Houghton, Mich., for the academic year 1930-31. Holders of these fellowships will enroll in the graduate school and be engaged in various problems connected with a general research program on iron and copper resources of northern Michigan. Among the approved subjects are an investigation of drill steel for use in mines, research in physical metallurgy, X-ray analysis, sintering and briquetting of fine ore, and various studies on ore dressing. Further information and special forms may be secured from L. F. Duggan, registrar of the college.

Sharp Drop in Automobile Production

WASHINGTON, Dec. 17.—Making a decline of 162,570, the production of motor vehicles in the United States in November was 217,441 units, against 380,011 in October and was the lowest since December, 1927, with a total of 133,309, according to the Department of Commerce. For the first 11 months of the current year, however, the production of motor vehicles was 5,235,316 units, an increase of 1,110,673 over that for the corresponding period of last year.

Passenger car output in November was 169,309, a decline of 151,018 from that for October, and was the lowest since December, 1927, with a total of

106,083. For the first 11 months of 1929 passenger car production was 4,494,813, against 3,616,179 for the corresponding period of last year, an increase of 878,634.

Production of trucks in November was 46,513, a decline of 12,303 from October and the lowest since December of last year, with a total of 28,123. For the first 11 months of the present year truck output was 724,424, an increase of 221,613 over that for the corresponding period of last year.

Building Porcelain Enameling Plant

Believing that porcelain enameling will be used more and more in connection with pressed steel for parts requiring a permanent, easily cleanable surface, the Youngstown Pressed Steel Co., Youngstown, Ohio, has awarded a general contract to the Austin Co., Cleveland, for the erection of a one-story plant, 60 x 382 ft., for vitreous enameling of pressed steel products. One of the chief products to be vitreous enameled is washing machine tubs. The enameling equipment for the new plant will be furnished by the Porcelain Enamel & Mfg. Co., Baltimore, and the electric furnaces and other electrical equipment by the Westinghouse Electric & Mfg. Co.

Advertisers Elect Officers

At a meeting of the Eastern Industrial Advertisers, Philadelphia, Dec. 13, the following were elected officers for next year: President, Anson B. Harvey, J. E. Rhoads & Son; vice-president, A. M. Robinson, J. G. Brill Co.; secretary, W. R. Kortkamp, Dill & Collins Co.; treasurer, L. A. Cleaver, F. W. Dodge Corporation. Directors: N. S. Greensfelder, Hercules Powder Co.; L. D. Waldron, McGraw-Hill Publishing Co.; D. K. Benoliel, International Chemical Co.; W. S. Hays, National Slate Association; T. B. Whitson, James G. Biddle; R. B. Sabin, S. S. White Dental Co.; R. E. Lovekin, R. E. Lovekin Corporation; D. C. Miner, Asbestos Slate & Shingle Co.; F. C. Weber, Keasbey & Mattison Co.

Electric Hoists

Electric hoists ordered in November were 10.6 per cent off in number and 7.2 per cent in value from the amounts for October. Shipments were smaller by 3.7 per cent. The Electric Hoist Manufacturers Association, E. Donald Tolles, 165 Broadway, secretary, will meet at the Hotel McAlpin, New York, Jan. 16.

Wean Engineering Co., Inc., Warren, Ohio, has been appointed agent for the R. D. Wood gas producers in the territory west of Altoona, Pa.

Birmingham

Pig Iron Melters Show No Interest in First Quarter Buying —Producers Advance Price to \$15 Base

BIRMINGHAM, Dec. 17.—Alabama producers of pig iron have opened their books for the first quarter at \$15, base, for district consumers. The Southern makers have held off longer than usual in announcing the first quarter prices, but consumers have shown very little interest in forward buying. This situation is attributed largely to heavy purchases in the fall and a falling off in the melt of most of the large foundries. Several of the larger melters have announced longer shut-downs for the holiday period than usual and others are reducing operations to a part-time basis. The decline in shipments during the past 10 days is considered the greatest for any similar period in several seasons. Sixteen furnaces have been active throughout this month. Nine of these have been operating on foundry iron, six on basic and one on recarburizing iron. The Roane Iron Co., Rockwood, Tenn., operating one furnace, plans to shut down Jan. 1 for an indefinite period.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$14.50
No. 1 fdy., 2.25 to 2.75 sil.....	15.00
Basic	14.50

Finished Steel.—Mills continue to experience a good demand in several important lines, including bars, plates, shapes, railroad accessories and steel castings. Those making these products will enter the new year with comfortable backlogs. The Ensley rail mill has tonnage on its books sufficient for several months' operation. Sheet demand has declined further, the past 10 days, with galvanized sheets bearing the bulk of the loss of trade. Mills continue to take first quarter business in all lines at unchanged prices. Structural steel fabricators report a good demand, and important tonnages are in prospect for early next year. New business in reinforcing bars is unusually light. The Tennessee company is working seven open-hearth at Ensley, one less than last week, and six at Fairfield. The Gulf States Steel Co. has been operating all six at Alabama City for some time in order to build up a reserve for operations while the new blooming mill is being installed next month.

Cast Iron Pipe.—Pressure pipe makers report a better feeling in the market. Active buying from municipalities and utilities is expected within the next few weeks. One company increased operations last week from a three to a four-day week. Plants will be closed down this week, but with one or two exceptions operations will be resumed on Dec. 30. Orders last week were for small tonnages. The McWane Cast Iron Pipe Co. booked an order for 10,000 ft. of 4-in.

pipe for Bay St. Louis, Miss. Prices are unchanged at \$37 to \$38.

Old Material.—With the exception of two or three items of steel scrap being taken by the large mills, the market is without activity. General shutdowns for the holiday period, together with efforts to reduce inven-

tories, are expected to keep the market dull until after the turn of the year. Prices are unchanged, and quotations represent nominal values.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$13.00 to \$13.50
Scrap steel rails.....	14.00
Short shoveling turnings..	9.00
Cast iron borings	9.00
Stove plate	11.50 to 12.00
Steel axles	22.00
Iron axles	23.00
No. 1 railroad wrought....	10.00 to 10.50
Rails for rolling	15.50
No. 1 cast	13.00
Tramcar wheels	12.50
Cast iron carwheels.....	13.00 to 13.50
Cast iron borings, chem....	13.50 to 14.00

St. Louis

Better Buying of Sheets Expected After Inventory Period —Pig Iron and Scrap Markets Dull

ST. LOUIS, Dec. 17.—The pig iron market is unusually quiet, for there is little buying either for prompt shipment or for first quarter. While a few inquiries for first quarter are pending, and it is said that other melters are beginning to think about their next year's requirements, it is not expected there will be any great amount of buying for first quarter. One reason for this is that melters in this district bought heavily during the early fall, when prices were low, and another is that in some instances the melt has not been as heavy as had been expected, with the result that there will be considerable tonnage carried over into the new year. Prices continue firm. Plants catering to the automobile car building and implement industries expect a marked improvement in business after the first of the year. Shipments of pig iron so far this month are said to be below November's volume, although about on a par with last December's shipments.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill. ...	\$19.50 to \$20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.42 to 18.92
Northern malleable, deliv'd	22.16
Northern basic, deliv'd....	22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel.—The Granite City Steel Co. reports that, while the volume of incoming sheet business is not entirely satisfactory, an improvement is foreseen, as both jobbers and fabricators are going into the year with exceptionally small stocks, virtually assuring a buying movement after the turn of the year. Demand for galvanized roofing is normally light for this time of year, and no particular improvement is expected until jobbers are ready to place orders for stocks in anticipation of the usual spring demand. Specifications for tin plate are seasonably light, but a healthy demand is expected after Jan. 1. Tank plates are being received in

satisfactory volume, as a result of demand from the oil fields and from freight equipment builders. Construction field continues inactive. The only reinforcing bar inquiry of size pending is a section of the River Des Peres project, which will require 2000 tons.

Old Material.—The market for old material continues dull. The three largest consumers in the district of melting grades continue to ask dealers to withhold shipments against contracts in order to hold down their inventories. In some cases, where railroads insist on shipments, the material is laid down in the yards of consumers with the understanding that it is to be paid for when convenient, which makes the dealers' financial problems more difficult. Because of the desire to hold down inventories, it is not likely there will be important buying until after the first of the year. Railroad lists include: Chesapeake & Ohio, 8173 tons; Chicago, Burlington & Quincy, 5620 tons; Missouri-Kansas-Texas, 1830 tons; International-Great Northern, 1000 tons; Louisville & Nashville, 14,440 tons; Wabash, 194 tons; New

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shaftings, screw stock	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	5.10c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.....	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

Orleans Great Northern, 105 tons; Pullman Co. (St. Louis), 8 carloads, and Nashville, Chattanooga & St. Louis, 7 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel.....	\$13.00 to \$13.50
No. 2 heavy melting or shoveling steel.....	12.00 to 12.50
No. 1 locomotive tires....	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart...	14.00 to 14.50
Railroad springs.....	15.50 to 16.00
Bundled sheets.....	9.50 to 10.00
No. 2 railroad wrought....	13.00 to 13.50
No. 1 busheling.....	9.75 to 10.25
Cast iron borings and shoveling turnings....	9.25 to 9.75
Iron rails.....	13.00 to 13.50
Rails for rolling.....	15.00 to 15.50
Machine shop turnings....	6.75 to 7.25
Heavy turnings.....	9.50 to 10.00
Steel car axles.....	18.00 to 18.50
Iron car axles.....	25.50 to 26.00
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought....	13.00 to 13.50
Steel rails, less than 3 ft..	17.00 to 17.50
Steel angle bars.....	14.00 to 14.50
Cast iron carwheels.....	14.00 to 14.50
No. 1 machinery cast.....	15.25 to 15.75
Railroad malleable.....	13.50 to 14.00
No. 1 railroad cast.....	14.50 to 15.00
Stove plate.....	11.75 to 12.25
Agricult. malleable.....	14.00 to 14.50
Relay. rails 60 lb. and under.....	20.50 to 23.50
Relay. rails 70 lb. and over.....	26.50 to 29.00

Youngstown Improved Rolling Mill Schedules This Week

YOUNGSTOWN, Dec. 17.—Steel companies in this district have increased production schedules for this week an average of 10 per cent, bringing the district average to around 55 per cent, against 48 per cent the week before. Departments which are accelerated are open-hearth furnaces, steel pipe, sheets and strips. At Warren, the Republic Iron & Steel Co. is operating this week all three of its strip mills, and such production is the best at any time in the past two months. The Youngstown Sheet & Tube Co. has likewise advanced its schedules to 45 per cent.

At Hubbard, the Sheet & Tube company is operating one of two blast furnaces, and some of the output of this stack is going to the merchant trade. The Struthers Furnace Co. is booked until Feb. 1, and has no present plans of suspending. However, it is likely the stack, a strictly merchant maker, will go down in the early part of next year for repairs.

Steel makers will suspend rolling mills for the most part during Christmas week, though some units will resume Thursday morning after Christmas Day.

Six hot-blast stove linings and two 40,000-cu. ft. disintegrators and eliminators have been ordered from H. A. Brassert & Co., Chicago, by the Jones & Laughlin Steel Corporation. These will be used in connection with the fine gas cleaning program at the Aliquippa plant.

Canada

Canadian National Orders 120,000 Tons of Rails and Nearly 5000 Cars—General Outlook Improved

TORONTO, ONT., Dec. 17.—Although the recent stock market crash brought an aftermath of uncertainty in the iron and steel industry of Canada, recent events have helped to dispel this pessimism, and the outlook is distinctly improved.

Canadian railroads are doing much to help the situation. Announced programs of the Canadian Pacific and Canadian National run into many millions of dollars. The Canadian National has ordered within the week 120,000 tons of rails and nearly 5000 box cars. The rail tonnage was divided between the Dominion Iron & Steel Co., Sydney, N. S., which was awarded 80,000 tons, and the Algoma Steel Corporation, Sault Ste. Marie, Ont., which will furnish the remaining 40,000 tons.

Equipment orders placed by the Canadian National were divided as follows: 2250 50-ton box cars and 25 tank cars to the Canadian Car & Foundry Co.; 1175 50-ton box cars to the National Steel Car Co., Hamilton, Ont., and about 1000 box cars and 200 refrigerator cars to the Eastern Car Co., New Glasgow, N. S. This road is inquiring for 18 Santa Fe type and 15 mountain type locomotives.

The new year will begin auspiciously for Canadian steel mills, locomotive works, car shops and allied industries. The agricultural implement and automobile industries are at the moment weak links in the chain of industrial activity. In these lines, however, there are prospects of improvement early in the new year.

Pig Iron.—Business closed during the week showed a gain, but the improvement was chiefly in orders for

future delivery. Some tonnage from the present quarter will be carried over into the new year.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$23.60
No. 2 fdy., sil. 1.75 to 2.25.....	23.10
Malleable.....	23.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$25.00
No. 2 fdy., sil. 1.75 to 2.25.....	24.50
Malleable.....	25.00
Basic.....	23.50

Imported Iron, Montreal Warehouse	
Summerlee.....	\$33.50
Carron.....	33.00

Old Material.—Renewed activity is beginning to develop in iron and steel scrap. Dealers are of the opinion that there will be a stronger demand for heavy melting steel and turnings in the near future. Dealers are picking up supplies at unchanged buying prices.

Dealers' buying prices:

Per Gross Ton		
	Toronto	Montreal
Heavy melting steel.....	\$10.00	\$8.50
Rails, scrap.....	11.00	9.00
No. 1 wrought.....	10.00	12.00
Machine shop turnings.....	7.50	5.00
Boiler plate.....	7.50	6.00
Heavy axle turnings.....	8.00	7.50
Cast borings.....	7.50	5.00
Steel borings.....	7.50	6.50
Wrought pipe.....	6.00	6.00
Steel axles.....	15.00	20.00
Axles, wrought iron..	17.00	22.00
No. 1 machinery cast.....	17.00	17.00
Stove plate.....	13.00	13.00
Standard carwheels..	16.00	16.00
Malleable.....	13.00	13.00

Per Net Ton		
No. 1 mach'ry cast..	\$16.00	....
Stove plate.....	12.00	....
Standard carwheels..	15.00	....
Malleable scrap.....	14.00	....

Cincinnati

Pig Iron Sales Increase Moderately—First Quarter Inquiries Appear—Scrap Market Steadier

CINCINNATI, Dec. 17.—Although the general demand for pig iron in this district continues to be sluggish, a slight increase in the total sales was noticed last week. District furnace representatives reported the sale of approximately 3000 tons. Of this, two orders, one for 400 and the other for 500 tons of Northern foundry iron, from unnamed consumers were the first sizable tonnages to be placed for first quarter. Melters, generally, are inclined to mark time, and no definite buying movement is expected before the first of the year. The remainder of the week's tonnage was in one to two carlots and was chiefly for immediate use. An inquiry has been received from a central Ohio consumer for 1200 tons of Northern foundry iron for first quarter, and

the Favorite Stove & Range Co., Piqua, Ohio, is in the market for 300 tons of the same grade of iron, also first quarter. The Roane Iron Co., Rockwood, Tenn., will blow out its stack about Jan. 1. Price schedules are being well maintained, although one Southern furnace is reported to be granting concessions of 50c.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25.....	\$19.89 to \$20.39
Ala. fdy., sil. 1.75 to 2.25..	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75..	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25..	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent.....	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Old Material.—Although new business in scrap is still slow, price sched-

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinf. bars.....	3.15c.
Rail steel reinf. bars.....	3.00c.
Hoops.....	4.05c.
Bands.....	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares.....	4.35c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	3.85c.
Small rivets.....	.65 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg.....	2.85
Cement c'd nails, base 100 lb. keg.....	2.85
Chain, per 100 lb.....	8.75
Net per 100 Ft.	
Lap-weld steel boiler tubes, 2-in.....	\$16.50
4-in.....	34.50
Seamless steel boiler tubes, 2-in.....	17.50
4-in.....	36.00

ules steadied last week, and no changes were made. Dealers are now adhering to the present prices in current purchases, usually taking scrap at the average of the spread. While there is no superabundance of good scrap, dealers report that there is sufficient available to supply specifications on current commitments.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$12.00 to \$12.50
Scrap rails for melting.....	13.00 to 13.50
Loose sheet clippings.....	8.00 to 8.50
Bundled sheets.....	10.75 to 11.25
Cast iron borings.....	8.25 to 8.75
Machine shop turnings.....	8.00 to 8.50
No. 1 busheling.....	10.00 to 10.50
No. 2 busheling.....	6.50 to 7.00
Rails for rolling.....	13.50 to 14.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	12.00 to 12.50
Short rails.....	17.50 to 18.00
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	18.50 to 19.00
No. 1 railroad cast.....	15.00 to 15.50
Burnt cast.....	10.00 to 10.50
Stove plate.....	10.00 to 10.50
Brake shoes.....	10.00 to 10.50
Agricultural malleable.....	14.00 to 14.50
Railroad malleable.....	15.00 to 15.50

Detroit Scrap Unchanged

DETROIT, Dec. 17.—There have been no changes in prices on old material during the past week. With many plants taking inventories, the feeling is that there will be no further decline over the remainder of the month, as scrap production is very low.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$11.50 to \$12.00
Borings and short turnings.....	9.00 to 9.50
Long turnings.....	8.00 to 8.50
No. 1 machinery cast.....	12.50 to 13.00
Automotive cast.....	11.50 to 12.00
Hydral. comp. sheets.....	11.00 to 11.50
Stove plate.....	9.00 to 9.50
New No. 1 busheling.....	10.50 to 11.00
Old No. 1 busheling.....	9.00 to 9.50
Sheet clippings.....	8.00 to 8.50
Flashings.....	9.50 to 10.00

To Build Ships for Black Sea Trade

WASHINGTON, Dec. 16.—Six ships of 9400 deadweight tons each, of which four are already under contract, will be built for the American Export Steamship Corporation as the result of a supplemental contract announced last week by Postmaster-General Brown, providing for the extension of the mail service to Black Sea and Mediterranean ports.

Boston

Pig Iron Prices Weaker—Scrap Steadier

BOSTON, Dec. 17.—Prices for Buffalo and east-of-Buffalo iron are weaker. A Massachusetts manufacturer of machinery has purchased 2000 tons of No. 1X and higher silicon iron at a price equivalent to less than \$17 a ton, Buffalo, and a Vermont foundry, feeling out the market for 1000 tons of No. 2X, has been offered iron at the equivalent of \$17, Buffalo. Smaller tonnages of No. 2X iron were sold the past week on the same basis, and a little business was taken at \$17.50. Furnaces pay scant attention to silicon differentials no matter how small the tonnage. Recent transactions include a small tonnage of Indian iron at \$21.50 and \$21 a ton, on dock here, duty paid, for No. 2X. A Worcester, Mass., foundry is inquiring for 800 to 1200 tons of malleable iron, and a Holyoke, Mass., foundry seeks 300 tons of foundry iron.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25.....	\$21.91 to \$22.41
*Buffalo, sil. 2.25 to 2.75.....	21.91 to 22.41
East Penn., sil. 1.75 to 2.25.....	22.65 to 23.15
East Penn., sil. 2.25 to 2.75.....	23.15 to 23.65
Va., sil. 1.75 to 2.25.....	25.21
Va., sil. 2.25 to 2.75.....	25.71
*Ala., sil. 1.75 to 2.25.....	24.11
*Ala., sil. 2.25 to 2.75.....	24.61
†Ala., sil. 1.75 to 2.25.....	20.25
†Ala., sil. 2.25 to 2.75.....	20.75

Freight rates: \$4.91 all rail from Buffalo; \$3.65 all rail from eastern Pennsylvania; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.
†Rail and water rate.

Reinforcing Steel.—Current business in billet steel bars is confined to small lots. Open quotations are 2.61½c. a lb., base, from stock on large tonnages and 3.16c. for small tonnages. The new power house for the Edison Electric Illuminating Co. of Boston will require 100 tons, instead of 200 tons as first reported.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates.....	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees.....	3.365c.
Zees.....	3.465c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined.....	3.265c.
Best refined.....	4.60c.
Norway rounds.....	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tie steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	*3.55c. to 5.55c.
Squares and flats.....	*4.05c. to 7.05c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.50c.
Per Cent Off List	
Machine bolts.....	50 and 5
Carriage bolts.....	50 and 5
Lag screws.....	50 and 5
Hot-pressed nuts.....	50 and 5
Cold-punched nuts.....	50 and 5
Stove bolts.....	70 and 10

*Including quantity differentials.

The market for rail steel bars is quiet at 2.26½c. a lb., base, delivered common Boston freight rate points.

Old Material.—Eastern Pennsylvania steel mills are still holding up shipments of scrap on old contracts, but there apparently is a little more life to the Pittsburgh market, and prices on old material for shipment there appear a little steadier. A Worcester, Mass., mill has dropped its buying price on long bundled skeleton 25c. a ton, but continues to take limited tonnages on No. 1 heavy melting steel at \$12.25 a ton, delivered. New England foundries are taking less textile and No. 1 machinery cast than heretofore, but that fact has failed to influence prices.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$9.50 to \$10.00
Scrap T rails.....	9.00 to 9.75
Scrap girder rails.....	8.50 to 9.00
No. 1 railroad wrought.....	10.50 to 10.75
No. 1 yard wrought.....	9.50 to 10.00
Machine shop turnings.....	5.50 to 6.10
Cast iron borings (steel works and rolling mill).....	6.00 to 6.10
Bundled skeleton, long.....	8.25 to 8.50
Forge flashings.....	8.00 to 9.00
Blast furnace borings and turnings.....	5.50 to 6.00
Forge scrap.....	8.50 to 9.00
Shafting.....	13.50 to 14.00
Steel car axles.....	15.00 to 15.50
Wrought pipe 1 in. in diameter (over 2 ft. long).....	8.50 to 9.00
Rails for rolling.....	10.50 to 11.00
Cast iron borings, chemical.....	9.00 to 9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast.....	\$14.00 to \$14.50
No. 1 machinery cast.....	15.00 to 15.25
No. 2 machinery cast.....	13.00 to 13.25
Stove plate.....	11.00 to 11.50
Railroad malleable.....	18.50 to 19.00

Buffalo

Bethlehem Operations Gain This Week

BUFFALO, Dec. 17.—There has been a good inflow of small pig iron orders, with some fairly sizable buying in the East. One furnace interest has taken 1000 tons of foundry, 1300 tons of foundry and malleable and 500 tons of malleable from New England. No important buying has occurred in the district, although there has been some small covering for January. The 800 tons of four-ry and malleable recently purchased by the New York Air Brake Co., was for the first quarter. The price in the East has been shaded. Shipments have declined slightly but are still good. One of the Donner stacks is down for repairs and will be returned to blast on or about Jan. 1.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$19.50
No. 2X fdy., sil. 2.25 to 2.75.....	20.00
No. 1 fdy., sil. 2.75 to 3.25.....	21.00
Malleable, sil. up to 2.25.....	20.00
Basic.....	\$17.00 to 18.00
Lake Superior charcoal.....	27.28

Finished Steel.—An increase is noted in the operations of the Lackawanna plant of the Bethlehem Steel Co., which now has 15 open-hearths in operation, all of the mills running on single turn and two of them on double turn. Operation at the Donner plant remains about the same. The Seneca Iron & Steel Co. is operating

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.95c.
Cold-fin. flats, sq. and hex.....	4.45c.
Rounds.....	3.95c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$3.60
Black wire, base per 100 lb.....	3.75

at about 50 per cent. A tunnel for the New York State hospital at Newark, N. Y., will require about 100 tons of reinforcing bars.

Old Material.—About the only transaction of interest since the recent purchase by one of the larger mills of a tonnage of No. 1 heavy melting steel at \$14 was the purchase of 1000 tons of stove plate at \$12.15. Of this, 500 tons was for immediate delivery and 500 tons for delivery after the first of the year. The Michigan Central list, which closed early in the week and came to Buffalo, brought \$12.52, Black Rock, net, or \$14.02 gross. There is a fairly good demand for specialties, but the foundry grades are extremely quiet.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$14.00
No. 2 heavy melting steel.....	12.50
Scrap rails.....	\$14.75 to 15.25
Hydraul. comp. sheets.....	12.50
Hand bundled sheets.....	10.50 to 11.00
Drop forge flashings.....	12.50 to 13.00
No. 1 busheling.....	12.50
Hvy. steel axle turnings.....	12.50 to 13.00
Machine shop turnings.....	8.00 to 8.50
No. 1 railroad wrought.....	10.50 to 11.00
Acid Open-Hearth Grades:	
Knuckles and couplers.....	17.00 to 17.50
Coil and leaf springs.....	17.00 to 17.50
Rolled steel wheels.....	17.00 to 17.50
Low phos. billet and bloom ends.....	18.00 to 18.50
Electric Furnace Grades:	
Short shov. steel turnings.....	10.75 to 11.25
Blast Furnace Grades:	
Short mixed borings and turnings.....	10.75 to 11.25
Cast iron borings.....	10.75 to 11.25
No. 2 busheling.....	8.00
Rolling Mill Grades:	
Steel car axles.....	16.50 to 17.00
Iron axles.....	20.00 to 21.00
Cupola Grades:	
No. 1 machinery cast.....	14.50 to 15.00
Stove plate.....	12.15
Locomotive grate bars.....	10.00 to 10.50
Steel rails, 3 ft. and under.....	17.75 to 18.00
Cast iron carwheels.....	11.50 to 12.00
Malleable Grades:	
Industrial.....	16.50 to 17.00
Railroad.....	16.50 to 17.00
Agricultural.....	16.50 to 17.00
Special Grades:	
Chemical borings.....	12.00 to 12.50

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.30c.
Soft steel bars.....	3.30c.
Small angles, 3/8-in. and over.....	3.15c.
Small angles, under 3/8-in.....	3.55c.
Small channels and tees, 3/4-in. to 2 1/4-in.....	3.75c.
Spring steel, 1/4-in. and thicker.....	5.00c.
Black sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.90c.
Galv. sheets (No. 24).....	5.30c.
Struct. rivets, 1/2-in. and larger.....	5.65c.
Com. wire nails, base per keg.....	\$3.40
Cement c't'd nails, 100 lb. keg.....	3.40

Pacific Coast

Steel Demand in West Shows Easing Off

SAN FRANCISCO, Dec. 14, 1929, (By Air Mail).—Demand has eased off considerably owing to the approach of the holiday season and the inventory-taking period. Outstanding awards include 1600 tons of plates for a penstock in Vancouver for the British Columbia Electric Railway Co., booked by the Vancouver Engineering Works; 900 tons of structural shapes for an office building on Montgomery Street, San Francisco, placed with McClintic-Marshall Co., and 365 tons of reinforcing bars for the Veterans' Home, Yountville, Cal., secured by the Concrete Engineering Co.

The Miracle Construction Co. took 293 tons of 6 to 10-in. Class B pipe for the improvement of Las Mesa Colony, San Diego, Cal. The United States Pipe & Foundry Co. was low bidder on 139 tons of 4 to 10-in. Class 150 pipe for Modesto, Cal. Bids open on Dec. 19 for 140 tons of 4 to 8-in. Class B pipe for West Salem, Ore.

The U. S. Engineer Office, Sacramento, Cal., has opened bids on 196 tons of 3/4-in. plate for shore pipe.

Pig Iron.—The pig iron market is without change. Current prices appear below.

Prices per gross ton at San Francisco:	
*Utah basic.....	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25.....	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25.....	25.00 to 26.00
*Delivered San Francisco.	
**Duty paid, f.o.b. cars San Francisco.	

Gray Iron Institute Names Committee Members

The Gray Iron Institute, Cleveland, has appointed the following committees for 1930:

COST COMMITTEE—John L. Carter, Sacks-Barlow Foundries, Inc., Newark, N. J., chairman; G. E. Finck, Bethlehem Foundry & Machine Co., Bethlehem, Pa.; William J. Grede, Liberty Foundry, Inc., Wauwatosa, Wis.; A. E. Hageboeck, Frank Foundries Corporation, Moline, Ill.; P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, Ohio; F. C. Schimpf, Olney Foundry Co., Philadelphia; L. C. Vallier, Buffalo Foundry & Machine Co., Buffalo.

FINANCE AND BUDGET COMMITTEE—H. J. O'Neill, Western Foundry Co., Chicago, chairman; H. S. Chafee, Builders' Iron Foundry, Providence, R. I.; H. R. Latferty, Red Jacket Mfg. Co., Davenport, Iowa; F. L. Squires, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; H. C. Wilson, Cleveland Cooperative Stove Co., Cleveland.

MERCHANDISING COMMITTEE—J. H. Bruce, Bowler Foundry Co., Cleveland, chairman; H. R. Cooke, Olney Foundry Co., Philadelphia; Gerald Hannay, Barnett Foundry & Machine Co., Irvington, N. J.; Don McDaniel, Decatur Casting Co., Hamilton, Ohio; R. R. Monroe, Des Moines Foundry & Machine Co., Des Moines, Iowa; J. H. Pohlmann, J. W.

Pohlmann Foundry Co., Buffalo; H. S. Washburn, Plainville Casting Co., Plainville, Conn.

RESEARCH COMMITTEE—B. H. Johnson, Florence Pipe Foundry & Machine Co., Florence, N. J., chairman; H. Bornstein, Deere & Co., Moline, Ill.; J. D. Coltman, Bullard Machine Tool Co., Bridgeport, Conn.; E. J. Lowry, consulting metallurgist, Detroit; R. D. Phelps, Francis & Nygren Foundry Co., Chicago.

TRADE INFORMATION COMMITTEE—Leo J. Filstead, John C. Kupferle Foundry Co., St. Louis, chairman; Harry Graham, Bond Engineering Works, Toronto, Ont.; W. J. Grede, Liberty Foundry, Inc., Wauwatosa, Wis.; C. B. Magrath, North Western Foundry Co., Chicago, Ill.; Charles S. Parker, Charles Parker Co., Meriden, Conn.; W. E. Stephen, Roberts & Mander Stove Co., Philadelphia.

TRADE PRACTICE COMMITTEE—R. M. Hill, East St. Louis Castings Co., East St. Louis, Ill., chairman; W. J. Maton, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.; Thomas W. Pangborn, Pangborn Corporation, Hagerstown, Md.; Chester A. Peebles, Stedman's Foundry & Machine Works, Aurora, Ind.; E. L. Wieland, Milwaukee Grey Iron Foundry, Milwaukee.

The personnel of the membership committee will be announced in the near future. Arthur J. Tuscany, manager, states that the standard cost finding system which the cost committee of the institute has been preparing will soon be ready for distribution to members.

Pittsburgh Scrap Dealers Reelect Officers

The Pittsburgh chapter of the Institute of Scrap Iron and Steel, Inc., at its annual meeting held on Dec. 12, reelected present officers. The officers are as follows: Charles Dreifus, Charles Dreifus Co., Pittsburgh, president; Ike Wilkoff, Wilkoff Co., Youngstown, vice-president; I. W. Solomon, Pittsburgh, secretary; Fred W. Wimmer, Hausman & Wimmer Co., Pittsburgh, treasurer.

H. N. Trimble, H. N. Trimble Co., Pittsburgh, was reelected chairman of the executive committee, and other members, with the exception of H. Tuch, United Iron & Metal Co., Pittsburgh, will also serve another year. Mr. Tuch, who retires on account of ill health, is succeeded by J. P. McCann of the same company. Other members of the executive committee are: Jay G. Stephens, Jay G. Stephens Corporation, Pittsburgh; Joseph Jacobson, Luria Brothers & Co., Pittsburgh; Hugh Ruffner, Wells-ville Iron & Metal Co., Pittsburgh; and Harry Cohn, A. H. Cohn & Sons, Butler, Pa.

Directors of the Crucible Steel Co. of America have declared a stock dividend of 3 per cent on common stock and have ordered the regular quarterly distribution of \$1.25 a share in cash on the common stock, both dividends payable Jan. 31 to holders of record Jan. 15.

Fabricated Structural Steel

With Awards of 51,000 Tons and Inquiries for 42,000 Tons, Market Is Unusually Active

WITH awards of 51,000 tons and inquiries amounting to 42,000 tons in the past week, there are no signs of the usual seasonal letdown in fabricated structural steel. About 70 per cent of the tonnage let in the last seven days will be required for buildings for non-industrial purposes. It is interesting to note that 13,000 tons is for work in Vancouver, B. C. Outstanding among awards were 7000 tons for a hotel at Vancouver, 6800 tons for a Philadelphia convention hall and 5500 tons for a railroad bridge at Indianapolis.

Approximately half of the tonnage on which bids were asked the past week is for construction projects in New York City. Revised plans for the Empire State Building, New York, call for about 52,000 tons of steel, as against the 40,000 tons previously reported. The steel for this building should be awarded the coming week. Awards follow:

MIDDLETOWN, CONN., 250 tons, foundry and boiler house, to an unnamed fabricator.

NEW HAVEN, CONN., 1070 tons, clinic for New Haven hospital, to Levering & Garrigues.

NEW YORK, 1120 tons, addition for Bloomingdale Brothers, to National Bridge Works.

NEW YORK, 565 tons, building at Walnut Avenue and 137th Street, to Reliance Steel Co.

NEW YORK, 1625 tons, Union League Club building, to Levering & Garrigues.

NEW YORK, 1900 tons, apartment building at Central Park West and Sixty-sixth Street, to Hinkle Iron Works.

NEW YORK, 2205 tons, two buildings for Central Hanover Bank & Trust Co., to Hedden Iron Construction Co.

NEW YORK, 965 tons, hotel on Washington Square, to McClintic-Marshall Co.

HOBOKEN, N. J., 365 tons, inspection shed for Delaware, Lackawanna & Western Railroad, to American Bridge Co.

PENNSYLVANIA RAILROAD, 400 tons, bridge at Coatesville, Pa., to American Bridge Co.

PENNSYLVANIA RAILROAD, 135 tons, two bridges, to Shoemaker Bridge Co. and Belmont Iron Works.

BALTIMORE & OHIO RAILROAD, 765 tons, bridge at Ohio Junction, Ohio, to Mount Vernon Bridge Co.

PHILADELPHIA, 6800 tons, convention hall, to Bethlehem Steel Co.

PHILADELPHIA, 2600 tons, bank and office building, Market and Juniper Streets, to American Bridge Co.

RICHMOND, VA., 2000 tons, building for American Tobacco Co., to Richmond Structural Steel Co.

PARKERSBURG, W. VA., 2080 tons, building for Viscose Co., to McClintic-Marshall Co.

YOUNGSTOWN, 335 tons, Erie Railroad grade crossing elimination work, to McClintic-Marshall Co.

INDIANAPOLIS, 5500 tons, bridge for Traction company, to American Bridge Co.

KENOSHA, WIS., 200 tons, building for Snap-On Wrench Co., to Milwaukee Structural Steel Co.

CHICAGO, 1000 tons, Twelfth Street viaduct, to an unnamed bidder.

PONTIAC, ILL., 200 tons, State buildings, to Mississippi Valley Structural Steel Co.

BLOOMINGTON, ILL., 150 tons, institutional building, to Mississippi Valley Structural Steel Co.

TROY, MO., 400 tons, highway bridge, to Vincennes Bridge Co.

DOUGLAS, ARIZ., 500 tons, building for Phelps Dodge Corporation, to St. Louis Structural Steel Co.

PHOENIX, ARIZ., 830 tons, office building on First Street, to McClintic-Marshall Co.

SAN FRANCISCO, 900 tons, office building, Montgomery Street, to McClintic-Marshall Co.

SAN FRANCISCO, 160 tons, shop for Pacific Electric Mfg. Co., to Herrick Iron Works.

SACRAMENTO, CAL., 168 tons, bridge over Corte Madera Creek, to unnamed fabricator.

SAN BERNARDINO, CAL., 104 tons, school auditorium, to Minneapolis Steel & Machinery Co.

LONG BEACH, CAL., 400 tons, sheet steel piling for city, to Steel, Inc.

ANAHEIM, CAL., 210 tons, telephone building, to McClintic-Marshall Co.

SEATTLE, 500 tons, plates, four oil tanks for Sunset Pacific Oil Co., to Steel Tank & Pipe Co.

SEATTLE, 230 tons, plates, pipe line No. 2, Cedar River project, to Beall Tank & Pipe Co.

GRANBY, B. C., 150 tons, plates, mill for Granby Consolidated Mining Co., to Vancouver Engineering Co.

VANCOUVER, B. C., 400 tons, plates, tanks for British Columbia Wood Preserving Co., to Vancouver Engineering Co.

VANCOUVER, 7000 tons, hotel for Canadian National Railways, to Dominion Bridge Co.

VANCOUVER, 2200 tons, Marine Building, to Dominion Bridge Co.

VANCOUVER, 1800 tons, Royal Bank building, to Dominion Bridge Co.

VANCOUVER, 1600 tons, plates, penstock, British Columbia Electric Railway Co., to Vancouver Engineering Co.

SPENCE, B. C., 460 tons, Thompson River bridge, to Western Bridge Co.

NEW WESTMINSTER, B. C., 100 tons, brewery, to Western Bridge Co.

FAIRBANKS, ALASKA, 150 tons, plates, 36-in. riveted pipe for Fairbanks Exploration Co., to an unnamed bidder.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

NEW YORK, 52,000 tons, Empire State Building; previously estimated at 40,000 tons.

NEW YORK, 4150 tons, 35-story building at Greenwich and Rector Streets.

NEW YORK, 1350 tons, apartment building at No. 2 Horatio Street.

NEW YORK, 1000 tons, apartment building at Seventy-ninth Street and Amsterdam Avenue.

NEW YORK, 2165 tons, Home for Incapables, at Third Avenue and 181st Street.

NEW YORK, 235 tons, repairs on bridges at Croton water shed.

FOREST HILLS, N. Y., 650 tons, addition to West Side stadium.

PHILADELPHIA, 1000 tons, Midway Theater.

PENNSYLVANIA RAILROAD, 900 tons, two bridges at New Brunswick, N. J.

CINCINNATI, 450 tons, two public schools.

CLEVELAND, 100 tons, Sldway Avenue suspension foot bridge for Nickel Plate Railroad.

DETROIT, 3500 tons, *Detroit News* building.

RACINE, WIS., 300 tons, school.

CHICAGO, 180 tons, warehouse for Edgar T. Ward Sons.

CHISHOLM, MINN., 400 tons, sintering plant.

SAN ANTONIO, TEX., 3000 tons, building for Southwestern Bell Telephone Co.

DENVER, 600 tons, United States Custom House.

VANCOUVER, B. C., 2500 tons, plates, pipe line; bids being taken.

VANCOUVER, 400 tons, pier extension for Canadian National Railways; bids being taken.

SEATTLE, 370 tons, Dumas Bay bridge; general contract to S. A. Mocerl.

JORDAN RIVER, B. C., 3000 tons, power house and penstock for British Columbia Electric Co.; bids being taken.

TACOMA, WASH., 300 tons, grain elevator; general contract to Albertson & C. U.

LOS ANGELES, 1800 tons, office building, Sixth and Flower Streets; bids being taken.

LOS ANGELES, 1400 tons, bakery for Van De Kamps; bids being taken.

SAN JOSE, CAL., 450 tons, hotel; bids being taken.

SAN FRANCISCO, 150 tons, magazine building for Government at Benicia; bids being taken.

SACRAMENTO, CAL., 196 tons, plates, 20-in. shore pipe for United States Engineer Office; bids opened.

Expect Large Car Needs in the First Quarter

Car requirements for shipment of iron and steel products during the first quarter of 1930 will just about equal the requirements in the corresponding quarter of 1929, according to the quarterly estimates of the Allegheny Regional Advisory Board, which covers business in central and western Pennsylvania, eastern Ohio, northern West Virginia and western Maryland.

This forecast, which is based upon shippers' replies to a questionnaire furnished by the board, predicts a decrease of 8 per cent in car requirements for tin plate, and a decrease of 2 per cent for iron and steel scrap. For machinery a 7.2 per cent increase is reported, while castings makers expect a 5.3 per cent increase.

The figures on iron and steel are interesting in view of the fact that the first quarter of 1929 was a period of considerable activity in the steel industry, and, if the prediction is correct, a rapid resumption of business would have to ensue in a short time.

The Ashland, Wis., iron ore docks have terminated the season's activities with a record shipment of 7,620,000 tons, an increase of 1,000,000 tons over loadings in 1928.

Non-Ferrous Metal Markets

Copper Market Has Better Tone—Sharp Decline in Zinc—Tin Advances

NEW YORK, Dec. 17.

Copper.—Despite a large increase in refined copper stocks during November and the lack of interest on the part of consumers, the tone of the market has improved somewhat in the past week and the likelihood of a break in the present price of electrolytic copper, which is 18c., delivered in the Connecticut Valley, has become more remote. Most buyers are still refraining from making purchases, except to take care of current needs. This feeling of hesitancy has been accentuated by the proximity of the year-end inventory period. Moreover, the gain of 38,518 tons in refined stocks, a considerably larger increase than was anticipated, has not enhanced the position of producers. Even though these factors are far from encouraging, they are partially offset by the betterment in operations of brass and copper wire makers, which should soon be reflected in an augmented demand for copper, and by the desire of certain large users to let the present price of copper stand undisturbed. Producers declare also that curtailment of output has got under way and their order books are in such a satisfactory condition that they can go along for an indefinite time without yielding to the insistent urgency of some consumers for lower prices. Business in the foreign market has been generally dull, although there were two days in the last week when sales rose above 2000 tons. Forward buying is virtually at a standstill. Users know that they will not have to pay more for copper after the first of the year, and consequently are waiting until inventories have been taken before filling January and February requirements. Electrolytic copper for export is unchanged at 18.30c., c.i.f. usual European ports. Lake copper is rather sluggish at 18c. to 18.12½c., delivered.

Tin.—Little business was transacted the past week. Yesterday's sales, estimated at 200 to 300 tons, were the largest for the seven-day period, and the market again is quiet today. Practically all of the current orders have been from dealers, consumers having manifested no interest in making further commitments. The market has been flooded with reports of amalgamations and curtailment of output. There is talk in the trade of a consolidation of the Eastern Smelt-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Dec. 17	Dec. 16	Dec. 14	Dec. 13	Dec. 12	Dec. 11
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*.....	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	41.37½	41.62½	41.62½	41.75	39.62½	39.37½
Zinc, East St. Louis.....	5.50	5.50	5.65	5.65	5.70	5.75
Zinc, New York.....	5.85	5.85	6.00	6.00	6.05	6.10
Lead, St. Louis.....	6.10	6.10	6.10	6.10	6.10	6.10
Lead, New York.....	6.25	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	23.25c.
Copper, hot rolled	26.75c.
Zinc	10.50c.
Lead (full sheets).....	10.00c.
Seamless Tubes—	
High brass	28.25c.
Copper	29.25c.
Rods—	
High brass	21.25c.
Naval brass	24.00c.
Wire—	
Copper	19.87½c.
High brass	23.75c.
Copper in Rolls	26.75c.
Brass Tubing.....	30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—		Base per Lb.
High brass	23.25c.	
Copper, hot rolled	27.75c.	
Copper, cold rolled, 14 oz. and heavier	30.00c.	
Zinc	10.75c.	
Lead, wide	10.30c.	
Seamless Tubes—		
Brass	28.25c.	
Copper	29.25c.	
Brass Rods	21.25c.	
Brass Tubing.....	31.00c.	

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	30.00c. to 31.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.
Brass Tubing.....	29.12½c. to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	10.75c. to 11.25c.
Zinc sheets, open.....	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	43.50c. to 44.50c.
Tin, bar	45.50c. to 46.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	7.00c. to 7.50c.
Lead, American pig.....	7.00c. to 7.50c.
Lead, bar	9.00c. to 9.50c.
Antimony, Asiatic	10.50c. to 11.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	28.50c. to 29.50c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	46.25c.
Tin, bar	48.25c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	8.00c. to 8.25c.
Lead, American pig	7.00c. to 7.20c.
Lead, bar	9.25c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade.....	18.00c.
Babbitt metal, high grade.....	49.00c.
Solder, ½ and ½	30.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	14.75c.	16.00c.
Copper, hvy. and wire	14.50c.	15.50c.
Copper, light and bottoms	12.50c.	13.50c.
Brass, heavy	8.00c.	9.00c.
Brass, light	6.75c.	7.75c.
Hvy. machine composition	11.00c.	12.00c.
No. 1 yel. brass turnings	9.00c.	9.50c.
No. 1 red brass or compos. turnings.....	10.50c.	11.75c.
Lead, heavy	4.75c.	5.25c.
Lead, tea	3.75c.	4.25c.
Zinc	3.25c.	3.75c.
Sheet aluminum.....	11.00c.	13.00c.
Cast aluminum.....	10.00c.	12.00c.

ing Co., Ltd., Williams-Harvey & Co., Ltd., and Penpoll Tin Smelting Co., Ltd. In London there has been heavy buying on the part of one concern which is thought to represent the new London group. The result has been a sharp advance in the London market which was quoted today at £186 for spot standard, £189 5s. for future standard, and £189 5s. for spot Straits. Despite the fact that American tin consumers have shown little or no interest, the local market has been influenced by the situation in London so that prices moved steadily upward the past week, and spot Straits tin was quoted today at 41.37½c., New York.

Lead.—There has been some fairly good buying for December and January delivery. In a few cases users have inquired for material for shipment in February, but producers are reluctant to quote that far ahead, feeling that possibly by that time there may be an advance in prices. Quotations are steady and unchanged at 6.10c., St. Louis, and 6.25c., New York.

Zinc.—Prime western zinc, which was 6c., East St. Louis, on Dec. 10, dropped during the past week until today it was selling at 5.50c. The decline brought out considerable business after the low mark of 5.50c. had

been reached and the opinion in the trade is that the market will become stabilized at that figure.

Antimony.—The nearness of inventory taking has resulted in a featureless market. Chinese metal is quoted today, for both spot and future delivery, at 8.50c., New York, duty paid.

Nickel.—Ingot nickel, in wholesale lots, is quoted at 35c. a lb., shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is priced at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Dec. 17.—Sales of tin in this market have been in sizable volume. Quotations on zinc and antimony are lower. Transactions in the old metal market are few in number and individually small.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 42.75c.; lead, 6.20c.; zinc, 5.75c.; in less-than-carload lots, antimony, 9.40c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Reinforcing Steel

Inquiries Include 2000 Tons for St. Louis Sewer

EIGHTEEN HUNDRED tons of reinforcing steel bars was awarded during the past week. All of the lettings were small, ranging from 100 to 350 tons each. New inquiries which came out totaled 6000 tons, of which 2000 tons is for a sewer at St. Louis. Awards follow:

WASHINGTON, 125 tons, addition to Bellevue Hotel, to John J. Widmeyer, Inc.

CHICAGO, 380 tons, Twelfth Street viaduct, to Kalman Steel Co.

OTTAWA, ILL., 160 tons, hotel, to Concrete Engineering Co.

SACRAMENTO, 365 tons, Veterans' Home at Yountville to Concrete Engineering Co.

SACRAMENTO, 317 tons, highway work in Imperial County; A. M. Peck, Los Angeles, general contractor, steel placed with unnamed bidder.

SAN FRANCISCO, 100 tons, office building on Montgomery Street, to Gunn, Carle & Co.

SAN FRANCISCO, 100 tons, factory for Link-Belt, Meese & Gottfried Co., to Gunn, Carle & Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEWARK, N. Y., 100 tons, tunnel for New York State Hospital; bids in Dec. 19.

PHILADELPHIA, 900 tons, Convention Hall, provisionally awarded to Concrete Steel Co., pending award of general contract.

BALTIMORE, 500 tons, Post Office.

COLUMBUS, OHIO, 300 tons, extension to Scioto-Olentancey Interconnecting sewer.

CHICAGO, 440 tons, building for the Pheoll Co.; A. S. Alschuler, architect.

CHICAGO, tonnage not stated, public school at Seventy-second Street and Clyde Avenue.

CHICAGO, tonnage being estimated, building for University of Chicago.

ST. LOUIS, 2000 tons, section F, River Des Peres sewer, for St. Louis Board of Public Service.

PHOENIX, ARIZ., 119 tons, cell house at Florence for State; bids Dec. 16.

SANTA ANA, CAL., 267 tons, bridge on Flower Street and on Santa Ana Boulevard; bids Dec. 16.

TACOMA, WASH., 400 tons, grain elevator; general contract to Albertson & Cornell.

TACOMA, 325 tons, power house No. 2, Lake Cushman project; general contract to Ward Construction Co.

LOS ANGELES, 104 tons for city; bids Dec. 18.

SAN JOSE, CAL., 300 tons, hotel; bids being taken.

RICHMOND, CAL., 550 tons, cannery; bids opened.

OAKLAND, CAL., 100 tons, hotel, Fourteenth and Jackson Streets; bids opened.

PORTLAND, ORE., 206 tons, Rogue River bridge; bids opened.

American Tankers Being Built Abroad

WASHINGTON, Dec. 17.—The Standard Oil Co. of New Jersey has placed orders with foreign yards for the construction of seven tankers, according to a report in the German press transmitted to the Department of Commerce from Hamburg. Three of the tankers are to be built in Germany, two in England, one in Italy and one in Denmark.

Railroad Equipment

Canadian National Railways Buy 4650 Cars

RAILROADS continue active in buying equipment. The purchase of 4650 cars by the Canadian National Railways was the feature of the market the past week. The Louisville & Nashville is expected to inquire soon for 1823 cars, while the Chicago, Milwaukee, St. Paul & Pacific is taking bids on 2300 cars. The Missouri Pacific and the Wabash have each ordered 25 locomotives. The Canadian National Railways are in the market for 33 locomotives and the Van Sweringen roads are reported to be ready to inquire for about 100 locomotives. Details of the week's business follow:

Chicago, Milwaukee, St. Paul & Pacific has inquired for 2300 of the 3350 cars it will buy in the near future. Bids are being taken on 1000 70-ton mill-type gondola cars, 600 50-ton flat cars and 700 box cars. It will soon enter the market for 750 stock cars.

Louisville & Nashville has authorized purchase of the following cars, inquiries for which will be issued shortly: 750 gondola cars, 300 hopper cars, 500 box cars, 250 flat cars, six passenger locomotives, three dining cars, four combination coach and baggage cars, four coaches, two baggage-mail cars, 10 baggage cars.

Chicago, Rock Island & Pacific is inquiring for 10 passenger coaches.

St. Louis-San Francisco has ordered three dining cars from Pullman Car & Mfg. Corporation.

Northern Pacific has ordered nine dining cars from Pullman Car & Mfg. Corporation.

Chicago, Burlington & Quincy is inquiring for 10 gas-electric rail motor cars.

Wabash has ordered three baggage-mail cars from American Car & Foundry Co. and 25 large freight locomotives from the Baldwin Locomotive Works.

Southern Railway is inquiring for 22 steel baggage-mail cars and one postal car.

Canadian National Railways have placed 2250 50-ton box cars and 25 10,000-gal. tank cars with Canadian Car & Foundry Co.; 1175 50-ton box cars with National Steel Car Co.; 200 refrigerator and 1000 box cars with Eastern Car Co. Inquiries are being made for 18 Santa Fe type locomotives and 15 Mountain type locomotives.

Missouri Pacific has purchased 25 locomotives from Lima Locomotive Works, Inc., and is taking prices on 10 coaches, five club cars and four parlor cars.

Van Sweringen interests are figuring on about 100 locomotives, inquiry for which will be out shortly. They will probably cover requirements of the roads controlled by these interests, which include the Nickel Plate, Chesapeake & Ohio, Erie, Pere Marquette and Hocking Valley.

Union Pacific is preparing specifications for 25 passenger locomotives.

Chicago & North Western plans purchase of 200 suburban coaches next year.

Empire Steel Corporation has moved its Chicago office to 520 North Michigan Avenue, room 1626.

PERSONAL

LOUIS C. REIS, who has been made president of the Minnesota Steel Co., Duluth, Minn., as announced in THE IRON AGE, Dec. 12, was born on Jan. 20, 1881, at New Castle, Pa., where he attended both grade and high schools. He served his apprenticeship in the shops of the Pennsylvania Engineering Works in the same city. He then entered the employ of the New Castle Works of Carnegie Steel Co. as a machinist, later being ad-



LOUIS C. REIS

vanced to turn foreman in the machine shop. On May 20, 1913, he became identified with the Minnesota Steel Co. as assistant master mechanic, a position that he held during the period in which the plant was constructed. Shortly after the plant was put into operation, under date of Feb. 1, 1916, he was appointed general master mechanic. On May 1, 1920, he was made general superintendent of the company, and on Sept. 26, 1927, he was elected vice-president, still retaining the position of general superintendent. On Dec. 9, 1929, he was made president and general manager of both the Minnesota Steel Co. and the Morgan Park Co., succeeding the late Samuel B. Sheldon. Mr. Reis has a record of 30 consecutive years of service with United States Steel Corporation plants. Although his father, Charles H. Reis, has not been connected with the steel industry, two of his father's cousins distinguished themselves in important rôles in the Steel Corporation organization. One of them, John Reis, was formerly vice-president of the corporation and president of the Minnesota Steel Co. The other, George L. Reis, was formerly vice-president and general manager of the Minnesota company. Both are now retired, John Reis residing in Montclair, N. J., and George L. Reis in Knoxville, Tenn.

BERTRAM G. PARKER has been elected president of the Youngstown

Foundry & Machine Co., succeeding W. J. WALLIS, who becomes chairman of the board of directors. Mr. Wallis has been head of the company 40 years. Mr. Parker has been with the company 31 years and for the past eight years has been vice-president and general manager.

E. B. NICHOLS, heretofore with the Bell Telephone Laboratories, and before that chief engineer of the Victor Talking Machine Co., Camden, N. J., has been appointed chief engineer of the Brown Instrument Co., Philadelphia.

H. G. MOUAT has been made Southern district representative, with offices in the Martin Building, Birmingham, for the Clark Controller Co., Cleveland.

W. P. WITHEROW, president, Witherow Steel Corporation, Pittsburgh, recently merged with the Donner Steel Co., Buffalo, was elected chairman of the board of the Donner company on Dec. 13. He has been identified with the steel trade for over 20 years.

HARRY G. UPHOUSE, who has been manager of the Philadelphia district office of the Donner Steel Co. since 1918, has been transferred to the Buffalo territory. He will have charge of steel and pig iron sales in that district. The Donner company's office in Philadelphia will be closed, and sales will be handled under the direction of the New York office, 120 Broadway, of which P. M. GUBA is district manager of sales.

H. G. KESHIAN, metallurgist, Chase Companies, Inc., Waterbury, Conn., will speak on "Deep Etch Test" at the December meeting of the New Haven chapter of the American Society for Steel Treating to be held Dec. 19 at Hammond Laboratory, Yale University.

H. D. MATTHEWS, formerly section engineer, Westinghouse Electric & Manufacturing Co., has been appointed consulting engineer for the W. M. Chace Valve Co., Detroit.

JOHN M. DAVIE has been made representative in western Pennsylvania and northern Ohio, excepting Toledo and suburbs, by the General Mfg. Co., maker of flexible power presses, Detroit. He has his headquarters at 2453 Overlook Road, Cleveland Heights, Ohio.

E. B. JONES, assistant traffic manager of the Norton Co., Worcester,

Mass., has been made a director of the Traffic Club of New England.

F. A. WHITEHEAD, formerly superintendent of rolling mills for the Copperweld Steel Co., Glassport, Pa., has been appointed general superintendent of that company, a newly created position. S. L. GIBASON, formerly assistant superintendent of rolling mills, has been named superintendent, and has been succeeded by J. C. GLOVER.

THORSTEN Y. OLSEN, son of Tinius Olsen, has been elected president of the Tinius Olsen Testing Machinery



THORSTEN Y. OLSEN

Co., 500 North Twelfth Street, Philadelphia, succeeding his father, who recently celebrated his eighty-fourth birthday and has retired from active participation in the affairs of the company. Thorsten Olsen has been vice-president of the company for a number of years, having been identified with it since he was graduated from the Sibley College of Engineering at Cornell University in 1903. He is a member of the Society of Automotive Engineers, American Society for Steel Treating, American Society for Testing Materials, Institute of Metals (British), Society of Military Engineers and the Engineers Club of Philadelphia. The retiring head of the company, TINIUS OLSEN, was the organizer of the company and has been the active head for about 50 years. He has long been interested in philanthropic work, especially in the place of his birth, Konigsberg, Norway. In September, 1928, his fellow-townsmen in Konigsberg unveiled a statue of him, in recognition of his work. He has also been knighted by the King of Norway and is a member of the Order of St. Olaf.

H. E. YEAGER, formerly in charge of Philadelphia district sales of pig iron for the Donner Steel Co., Buffalo, but for the past year on the steel sales staff of the company in the Buffalo territory, has joined the Philadelphia sales organization of Joseph T. Ryerson & Son, Inc., Chicago.

OBITUARY

JOHN MORRISON HANSEN, chairman of the board of the Standard Steel Car Co., Pittsburgh, died on Dec. 13 at La Rochelle, France, where he was visiting in the interests of the company's plant at that place. Mr. Hansen was born in Butler County, Pa., and had spent his entire life in the Pittsburgh district. He was one of the pioneers of the steel car industry, having become associated with the Pressed Steel Car Co. shortly after his graduation from the Western University of Pennsylvania, now the University of Pittsburgh. He served as chief engineer of the Pressed Steel company, and, when the Standard company was organized in 1902, he became its president. He later became chairman of the board and in recent years had been required to spend considerable time abroad in the interests of the company's foreign plants.

DAVID C. KLAUSMEYER, general manager, Cincinnati Bickford Tool Co., died suddenly in Cincinnati, Dec. 6, as was noted in this column in the issue of Dec. 12. The brief sketch there given of his career, starting as apprentice in the Bickford Drill & Tool Co., indicated how much of an authority he was on drilling machinery.

WILLIAM H. REA, formerly treasurer of the Mesta Machine Co., Pittsburgh, and for many years active in the roll and rolling mill business, died at his home in Pittsburgh on Dec. 15. He was born in that city 73 years ago, and, after attending Phillips Andover Academy and the Massachusetts Institute of Technology, he joined the Robinson & Rea Mfg. Co., Pittsburgh, of which his father was one of the founders. When that company was merged with the Leechburg Foundry & Machine Co. into what is now the Mesta Machine Co., Mr. Rea became treasurer of the latter. For almost 50 years he served as secretary of the Iron Roll Association, retiring from that position early this year.

FRED D. HOLDSWORTH, formerly engineer in charge of air compressor design at the Claremont, N. H., plant of the Sullivan Machinery Co., Chicago, died Nov. 20, aged 62 years. He had been with the company from 1900 until his retirement in 1928, and had been granted many patents in connection with the development of Sullivan machines.

H. G. SEMPLE, for nearly 51 years associated with the Jones & Laughlin Steel Corporation, Pittsburgh, died at his home in Etna, Pa., on Dec. 14. He went to work for the company as a boy of 15, and had been employed in

a number of departments prior to his association with sales, which began in 1903. Since 1911 he had been identified with the Pittsburgh city sales



J. M. HANSEN



D. C. KLAUSMEYER

department, and was well and favorably known in the steel trade in that district.

JOHN D. BIRD, pioneer in the development of Corliss engines and internal combustion engines, died at his home in Milwaukee on Dec. 8, aged 61 years. After leaving high school, he became an apprentice in the plant of Hewes & Phillips Iron Works, Newark, N. J. In 1900 he helped organize Conover & Co., consulting engineers, New York, and 11 years later became general superintendent at the Beloit, Wis., plant of Fairbanks, Morse & Co., where he was engaged in developing light and heavy-duty gasoline and oil engines. In 1907 he became assistant to the works manager of the Worthington works of the International Steam

Pump Co., Cudahy, Wis., and two years later was promoted to works manager, continuing in that capacity until the plant was abandoned in 1922. During the war he was president of the Wisconsin Gun Co., Milwaukee.

DAVID MILLER, founder and president of the D. Miller Scrap Iron Co. and the De Pere Paper Co., died at his home in Green Bay, Wis., Dec. 9, aged 70 years.

Automobile Production 10 Per Cent Off in 1930

A reduction of less than 10 per cent in 1930 automobile production, as compared with the present year's production, is predicted by *Automotive Industries*, in its annual estimate of future production and sales conditions in the automotive manufacturing industry. The actual figure set by the publication is 4,945,000 units for next year, which will be about 500,000 fewer units than the record-breaking final showing for 1929.

International Licensing Large This Year

HAMBURG, GERMANY, Dec. 2.—Licensing of foreign companies to use German patents affecting the production of steel, non-ferrous metals and machinery has been unusually active this year. In the first nine months, companies in the United States acquired 193 licenses or patents from Germany and German companies bought 107 from American patent holders. Great Britain acquired 192 from Germany and Germany obtained 91 from the British; Belgium secured 103 from Germany and Germany 56 from Belgium; Japan acquired 87 patents or licenses from Germany and disposed of six licenses to German companies.

The Manganese Steel Forge Co., Philadelphia, manufacturer of Rolman screens and other rolled and forged manganese steel products, has discontinued its Cleveland office and the Cleveland district hereafter will be handled by J. H. McKinley, manager of the Pittsburgh office. P. M. Hobbs, formerly in Cleveland, now has charge of the company's Chicago office.

Cleaning steel for porcelain enameling was one of the topics discussed by 110 district managers and representatives of Oakite Products, Inc., New York, who attended the company's twenty-first annual sales conference on Nov. 20, 21, 22 and 23. The reading and discussion of papers were supplemented by practical laboratory experiments to acquaint the men with the new improvements in cleaning methods.

Revival of Iron Mining in Normandy

(Concluded from page 1667)

profitable, perhaps 3000 ft. or so, and along the very extensive outcrops they can be followed, due to repeated folds, for something like 400 miles.

A Rich Iron Ore, High in Phosphorus

On the accompanying sketch map are located all the Armorican mines which have been in activity during 1928 or 1929. There are also noted the two local steel works (at Colombelles near Caën and at Trignac near St. Nazaire), and the export shipping points (Caën, Granville, Nantes and St. Nazaire). The three main mining operations are separately named on this map (Soumont, May and Segre), and the other mines are located by crosses.

Actual shipping grades of the active mines, in carload or cargo lots, are as shown in the accompanying table.

With labor in this district ranging still below \$1 per day, costs are naturally also low. My estimate is that a ton of ore on board cars at mine at present costs from 60c. to \$1 and will average around 75c. This is a cost of almost exactly 1.5c. per unit of iron.

Selling prices at present are 11 shillings per ton f.o.b. Caën for Norman ores, as against 14 shillings per ton f.o.b. Nantes for Anjou ores. These compare with 20 to 25 shillings c.i.f. British ports for Spanish and Algerian ores of 50 per cent grade, and show that the Armorican field can meet any normal competition.

Output Increasing Rapidly

We can now come to some conclusion as to the probable future and competitive possibilities of this new ore field.

First we may briefly note the total outputs of ore in the Armorican field for certain past years. Modern development of the field dates back only to 1910, while of course the war disorganized its growth, giving unnatural increases in a few years and a serious collapse afterward. The field produced about half a million tons in the depression of 1921; by 1923 the output was somewhat over a million tons; in 1928 it passed 2½ millions. These are, admittedly, not large totals; but the rate of growth which they show is far higher than most other fields during this same period.

Of the total, just about half is used by furnaces in the Armorican region itself; the rest goes to Lorraine and Westphalia. Based on official data for 1928 and my own estimates for 1929 I should say that in these two years the average ore output of the Armorican region was distributed about as follows: 1,250,000 tons by rail to furnaces at Caën and St. Nazaire, 300,000 tons by rail to French furnaces in Lorraine, and 1,000,000 tons by rail and ship to German furnaces in Westphalia, making a total of 2,550,000 tons for 1928, and a similar amount for 1929.

Estimates as to future progress must take into account not only the probable total needs of the world's furnaces in future years, but the relation of the Armorican field to its other great competitors and to its possible markets.

With what we know now about world iron ore reserves, we can safely say that there are existent at least eight great ore fields, in each of which the probable reserve tonnage, figured in any possible way, would range from 1,000,000,000 to 4,000,000,000 tons.

These are tabulated, in order of their annual output, with a few additional data on grades:

Present Output Rank	Developed About	Per Cent Iron	Phosphorus
1. Lake Superior, U. S. A.	1860	50	Low
2. Lorraine, France.	1870	35	High
3. Alabama, U. S. A.	1875	35	High
4. Cleveland, England.	1860	28	High
5. Armorica, France.	1910	50	High
6. Wabana, Newfoundland.	1900	50	High
7. Mayari, Cuba.	1905	50	Low
8. Brazil. . . . .	.....	60	Low

	Magnetites			Hematites			Roasted Car-bonate	Work-able Limits
Metallic iron.	53.78	53.69	52.5	48.32	48.91	47.94	48.70	46 to 54
Manganese.	0.19	0.30	n.d.	0.32	0.30	0.38	0.56	
Phosphorus.	0.89	0.96	0.65	0.72	0.72	0.56	0.67	0.5 min.
Sulphur.	0.027	0.03	n.d.	0.05	n.d.	0.01	n.d.	
Silica.	10.84	11.96	11.0	13.80	15.79	15.71	13.75	8 to 16
Lime.	n.d.	2.57	(a)	2.54	3.01	0.08	n.d.	
Magnesia.	0.67	0.48	(a)	1.03	1.44	n.d.	n.d.	

(a) Lime plus magnesia is 2.5 per cent.

It will be seen immediately that these eight great ore fields fall into two sharply contrasted classes. On the one hand we have three fields of relatively low-grade ore, but located near to coal fields and to good steel markets; all their ore is consumed locally; they can never export ore of such grades; they tend rather to import higher grade ores for mixtures. These three are Lorraine, Cleveland and Alabama. As contrasted with this we have Lake Superior, Wabana, Armorica, Cuba and Brazil, all having deposits of relatively high-grade ore, all shipping most of their output to distant furnaces located near coal fields or markets. And of these five "exportable" fields, Lake Superior finds its markets in its own country; Cuban ore has certain special difficulties in chemical composition; and Brazil is probably several decades at least from becoming a serious factor in the ore market.

So in the long run the fields whose output will meet in the Atlantic markets of America and Europe are (1) Armorica, (2) Wabana, (3) Scandinavia, (4) North Africa and (5) Spain. With production costs as they are now, Armorica has more than an even chance in any such competition, particularly for the furnaces in Great Britain, Germany and Lorraine. And since its entire output at present is being mined from less than 5 per cent of its workable outcrop, we may fairly expect a continuation of its relatively rapid rate of growth. An annual output of ten to fifteen million tons of Armorican ore could readily be mined and marketed within the next decade; and this will require something more than the present scale of organization.

Engineers Hold Prominent Place in American Life

Of the 28,805 "notable living men and women of the United States" named in "Who's Who in America" (1928-1929), men of science comprise 30.4 per cent, lawyers 15.2 per cent and physicians and surgeons 7.3 per cent, according to L. W. Wallace, executive secretary of the American Engineering Council, Washington, and J. E. Hannum, editor of the Engineering Index Service, New York, in a paper on "Engineers in American Life," presented at the recent annual meeting of the American Society of Mechanical Engineers in New York.

"The 2858 engineers and architects named received 1417 academic degrees in branches of learning other than science, as well as 2497 scientific degrees. They are members of 1138 associations, conference boards, and commissions, half of which are non-technical. They hold 4785 official positions in 3928 organizations, of which number 2993 are industrial and commercial companies. They occupy the position of president in 1128 industrial and commercial organizations, 72 engineering firms, 68 banks and trust companies, and 23 colleges and universities. Among these 2858 engineers and architects there are, or have been, ten governors, 13 members of Congress, two members of the Cabinet, and the President of the United States."

Turning With Shallow Cuts at High Speed

(Continued from page 1663)

of the form shown in Fig. 3 was ordinarily used for the trailer.

From three to six tools were tested after each of two grindings for each condition investigated, and the tests were all made in sequence. For example, in the study of the effect of cutting speed on tool performance, one tool was tested at each of the selected speeds in the series, then a second tool was tested at each of the different speeds, and this procedure repeated until the desired number of tools had been tested for each condition. Only average values are used in the comparisons made throughout the report.

The results and conclusions of the tests were summarized by the authors as follows:

With the carbon and high-speed steel tools used, the second tool began to cut when the leader had worn 0.001 to 0.002 in. All subsequent comments on turning with shallow cuts and fine feeds are based on this end point, but greater wear can be made to represent tool failure by using a shallower setting for the second tool than is used for the cutting tool.

Tests were made dry at different cutting speeds, feeds, and depths of cut on nickel-steel forgings with tensile strengths of 80,000 to 100,000 lb. per sq. in. to give a broad background for the interpretation of the results of tests of different tool steels, first heat treated in various ways. The results could be represented approximately by the following equations in which V is the cutting speed, T the tool life, F the feed, D the depth of cut, A the area of cut ($=DF$), and c , K , K_1 , K_2 , and n are constants.

For high-speed-steel tools,

$$VT^{1/n} = c \dots \dots \dots [1]$$

$$V = K_1 - K_2(DF) = K_1 - K_2A \dots [2]$$

For carbon-steel tools,

$$V = \frac{K}{DF} = \frac{K}{A} \dots \dots \dots [3]$$

These equations are not to be construed to represent the true laws of cutting, since the cutting speed is probably not affected equally by variations in the feed and the depth of cut. However, they represent approximately the results of the experiments made with depths of cut of 0.005 to 0.020 in. and feeds of 0.0115 to 0.0204 in. per revolution.

Coolants Result in Better Finish

In tests of short duration, where tool failure occurred in about 2 to 10 min. the tool life was increased somewhat more by the use of water than by lard oil, but in tests of about 50 min. duration under the same feed and depth of cut but lower cutting speeds, these two liquids produced effects of the same magnitude. The increases in tool life from the use of these liquids were not large in any case, but the finish on the work piece at the end of the cut was better with the liquids than without.

Tests with tools of different forms and angles showed that the successful application of the described method of test was not dependent upon having the broad-nose tool used in a majority of the experiments. Tools with a plan angle of 65 deg. had a longer life than the broad-nose tools, but the finish produced on the nickel steels in dry turning did not appear to be as good. The best tool life in the broad-nose tools was obtained with a back slope of 30 deg.; a side slope of 0 deg. was better than one of 8 deg.

Effect of Composition and Heat Treatment of Tools

The cutting speed of quenched carbon-steel tools was not affected appreciably by variations in carbon content from 0.75 per cent to 1.3 per cent nor by subsequent tempering at temperatures up to 375 deg. Fahr., which did

not lower the hardness; the cutting speed of the carbon-steel tools was equal approximately to that of a quenched "oil-hardening" tool steel, and only slightly lower than the cutting speed of a steel containing 1.3 per cent carbon and 2¾ per cent tungsten.

The cutting speed of carbon-steel tools was lower in all cases than that of high-speed-steel tools, but the differences between the two decreased with decrease in the areas of cut in dry turning.

The heat treatments which resulted in the best roughing-tool performance for high-speed steels of customary compositions also resulted in superior performance under shallow cuts and fine feeds. These treatments comprised oil quenching from the highest practical temperatures, followed by tempering to convert the larger part of the retained austenite to martensite.

Of 12 elements added in different proportions to chromium-tungsten or chromium-tungsten-vanadium high-speed steels only one, cobalt, produced decidedly beneficial results. Molybdenum and nickel offered promise under certain conditions, while the remainder either had a negligible effect or were definitely deleterious from one viewpoint or another.

Cobalt Improves Tool Performance

Cobalt improved the performance of the high-speed-steel tools both under shallow cuts and under heavy duty, but the maximum benefits were obtained only with high hardening temperatures. The percentage gain from the addition of cobalt was somewhat greater in rough turning than with shallow cuts and fine feeds, but increase in cobalt above about 5 per cent did not produce improvements commensurate with those resulting from 3.5 to 5 per cent and high hardening temperatures.

Replacement of part or all of the tungsten in high-speed steels by molybdenum, in the ratio of 1 part molybdenum to 2½ parts of tungsten, produced steels having performance comparable to that of the tungsten steels. Such substitution should be useful in case of a depleted tungsten supply, but is not advocated at the present time since there was some evidence of irregular performance in the high-molybdenum steels and their hot-working properties did not seem to be as good as those of the tungsten steels. However, a steel with 7 per cent molybdenum and no tungsten had one advantage over the tungsten steels for roughing tools in that its hardness and performance were not so largely affected by variations in the hardening temperatures.

The addition of 3¾ per cent of nickel to the customary chromium-tungsten-vanadium steels was beneficial for the rough-turning tools, particularly when combined with a 50 deg. Fahr. increase in the hardening temperatures, but was detrimental to the tools used under shallow cuts and fine feeds and adversely affected the machining properties of the high-speed steel itself. Lowering the carbon from 0.6 or 0.7 per cent to 0.5 per cent improved the machining properties without affecting the performance of the roughing tools, but was detrimental to the tools used under shallow cuts.

Effect of Arsenic and Other Elements

Each of the four elements, arsenic, antimony, copper, and tin, adversely affected the tool performance of high-speed steels under shallow cuts, and the magnitude of the decrease became greater as the proportions of these elements increased. Copper was the least harmful; next in order came tin, while arsenic and antimony were the most objectionable.

The effects of these four elements upon the perform-

ance of roughing tools did not necessarily correspond to those observed with shallow cuts. The 0.8 per cent arsenic additions lowered the cutting speed, but the addition of 0.4 per cent antimony or 0.5 per cent or less of tin had no measurable effect. Higher proportions of tin lowered the cutting speeds. The high-speed steels containing 0.36 to 1.77 per cent copper showed slightly better performance than the corresponding steels without copper.

The steels containing 0.4 per cent antimony, 0.8 per cent or more of copper, or 0.8 per cent arsenic did not have good hot-working properties, illustrated by numerous corner cracks on the bars, while those containing 1.7 per cent antimony or 1.8 per cent tin showed a high degree of hot shortness and could not be forged or rolled. Also the steel with 1.77 per cent copper could itself be machined only with difficulty in the annealed condition.

Phosphorus up to about 0.06 per cent and sulphur up to 0.215 per cent did not appear to be injurious, from the viewpoint of lathe-tool performance of the customary chromium-tungsten-vanadium steels, with or without cobalt. However, high sulphur tended to lower the cutting speeds in the presence of 3¼ per cent nickel. Because of the possibility of segregation of the phosphorus and the introduction of numerous sulphide inclusions in high sulphur steels, these two elements can advisedly be kept within low limits for all high-speed-steel lathe tools.

Aluminum Lowers Cutting Speeds

Aluminum adversely affected the performance of the high-speed-steel tools both with shallow cuts and under heavy duty. It was one of the few metals considered which, in proportions around 0.3 per cent, produced a measurable decrease in the cutting speeds in rough turning. This decrease became greater as the proportion of the aluminum was increased, and with 0.8 per cent the drop in cutting speed was greater than that produced by equal proportions of any of the other elements considered. These changes were accompanied by decrease in the hardness of the quenched steels, probably through decrease in the dissolving capacity of the aluminum-iron solid solution for carbon, chromium, tungsten, and vanadium. With 0.8 per cent aluminum there was also evidence of a low-melting eutectic in samples quenched from 2350 deg. Fahr.

Titanium was another of the elements which appeared to lower the dissolving capacity of the austenite, and as a result the hardness and the cutting speeds of the high-speed-steel tools decreased with increase in the titanium. Its interference was lessened, probably through the formation of less harmful carbides, instead of solution as titanium in the austenite, by increasing the carbon content of the steel.

Tantalum did not appear to be promising as a substitute for vanadium or as an alloying element in the customary chromium-tungsten high-speed steels for lathe tools. It acted in a manner similar to aluminum and titanium in that it appeared to decrease the dissolving power of the austenite for the chromium and tungsten compounds and so decreased the hardness and cutting speeds of the quenched lathe tools.

Power Required to Drill Cast Iron and Steel

THE drilling tests presented in the paper by Professor O. W. Boston and C. J. Oxford were on two cast irons, one made up of 20 per cent charcoal pig iron, and 17 different steels selected to cover material commonly used in modern manufacture. Standard twist drills ranging from ½ to 1½ in. were used. The drills were considered sharp in all tests and a coolant consisting of one part soluble oil and 16 parts of water was used in all cases. The scope and some of the conclusions of the test are:

Data as to drilling torque, thrust, computed horse-

power at the drill point, and net horsepower supplied to the machine as measured on a recording wattmeter are given under two headings: commercial tests and special tests. All commercial tests were run at a peripheral speed of the drill of approximately 60 ft. per min. The feed for each drill size was as near to those given in the usual commercial-drilling table as the change gears available would permit. They were as follows: 0.009 in. per revolution feed for the ½-in. diameter drill, 0.011 in. for the ⅝-in. drill, 0.012 in. for the ¾-in. drill, 0.013 in. for the 1-in. drill and 0.015 for the 1¼- and 1½-in. drills.

Special tests were run on various cast irons and steels so that the influence of the speed, feed, and drill diameter could be determined, in order that the results of the commercial-drilling tests could be extended to cover any other conditions of drilling for each material. It was found from these special tests that the thrust for both cast iron and steel increased in direct proportion to the drill diameter d ; that the torque increased in proportion to d^2 for cast iron and $d^{1.5}$ for steel. The thrust increased with an increase in feed f , but at a rate as slow as $f^{0.6}$ for both cast iron and steel. The torque increased as $f^{0.6}$ for cast iron, but $f^{0.75}$ for steel. It was found that the torque and thrust remained practically constant over the whole range of speeds covered from 74 to 441 r.p.m. for each drill size and feed.

High Speed in Cupola Melting

(Concluded from page 1659)

In order to obtain the metallurgical advantage in melting, and more particularly in high-speed melting, it is necessary to maintain a clean cupola. Limestone, mentioned because of its almost universal use, charged on the coke in the ratio of one to four, and with a charge on the bed coke to start off, will flux the cupola cleanly and will not affect the lining unduly. Slag should be removed from the cupola, commencing at the time the third charge reaches the tap hole.

Responses to Many Questions

Following the general presentation of his subject, Mr. Truxell informally answered many questions, some of which are reviewed here. In making high-test iron, where charges in some cases consist of 100 per cent steel scrap, some foundries have made iron with a carbon content as high as 3 per cent. Formerly a very hard, dense coke was regarded as the best, but in the speaker's opinion, a free-burning high-volatile coke is much better. So-called "silvery coke" is not now so highly thought of. A uniform charge in weight is recommended throughout.

That iron should be melted as hot as possible, no matter what kind of casting is to be poured, is the opinion of the speaker. Ingot molds, thus made, will stand up 40 per cent longer. The largest sanitary manufacturer in the country uses 72-in. cupolas and an air pressure of 7 in. Hot iron is poured continuously at the rate of 18 tons per hr. Asked as to whether melting conditions could be determined by the color of smoke issuing from the stack, Mr. Truxell replied, not usually. In response to a query as to whether foundries in general are using too much blast, he answered that as a rule more is used than is necessary.

Closer Affiliation With National Society

A movement which has been considered for some time by the local Philadelphia foundrymen and has been advocated by the officers of the American Foundrymen's Association has finally come to a head. It was announced that Julian Greenstreet, superintendent, Olney Foundry Co., Philadelphia, has been appointed as liaison representative of the local foundrymen to keep in close touch with the activities of the national organization.

Book Reviews

(Continued from page 1669)

stead of the broader present curriculum. Forty thousand trained technical men must be recruited before the end of the period, and it is planned to expand the technical evening schools for workingmen. Here, the adoption of the 7-hr. day is viewed as offering tremendous possibilities.

Control of imports constitute an important feature of the five-year plan. Complete elimination of luxuries will be continued, drastic economy in purchases of consumption goods and a corresponding increase in imports of goods for productive purposes. In the five-year period it is planned to spend 6,180,000,000 rubles for imports, of which "equipment for industry and transportation" will cost 1,784,000,000 rubles.

In the appendix a list is given of twenty-five American companies and individuals with which contracts for technical assistance have been closed. Five more have been negotiated since publication of the book. G. S. H.

Buying In a Large and Small Way

Principles of Scientific Purchasing. By Norman F. Harri-man. 265 pages, 6 x 9 in., illustrated. McGraw-Hill Book Co., Inc., New York. Price \$3.

At the outset the author points out that merchandising, advertising and distribution have attained a degree of importance greater than that of production. The importance of the purchasing function is indicated by the necessity for knowledge of the many processes of which purchasing is the final act. Besides these, there are other factors—technical, market conditions, economic factors, stores control, obsolescence, future requirements, price and business trends. It seems apparent that technical training is regarded with favor by the author.

Economic aspects are based upon or correlated with the elimination of waste and economical operation. Financial features of the purchasing agent's job presuppose such knowledge and alternative sources of supply, discounts, moral standing, payments, and storage costs. Psychology has its place, for in this field are the attitudes and reactions between buyer and seller, strategy, and relations with salesmen.

As to the purchasing agent himself, he is an aggressive, important, practical man and the friend of real value. He is either an engineer or possesses the engineering point of view, a factor which is one of the most significant of our modern business achievements. He possesses courtesy, is eager for ideas which are vital to his business, knows materials, recognizes psychology, and possesses the ability to protect himself. He is fair and earns and maintains the respect and confidence of all with whom he comes in contact.

T. W. BUXTON.

Commodity Exchanges. By Julius S. Baer and George P. Woodruff. 319 pages, 5 x 8½ in., illustrated. Harper & Brothers, New York. Price \$5.

This is both textbook and reference work, written in clear language by men who understand their subject. One of the authors directed the legal work in connection with four of New York's recently organized exchanges, and the other is a recognized investment analyst. The book supplies a complete description of every phase of the operation of commodity exchanges, and their place in the commercial world. The characteristics common to the various exchanges, the ways in which they differ, and the advantages they offer to all individuals dealing in commodities, are explained in considerable detail.

Describing the evolution of the modern exchange, the

authors explain the workings of the "futures contract" and the difference between the cash and futures markets. The work includes a comprehensive discussion of the need for the futures contract in modern distribution, how it should be used by dealers, manufacturers, and others, and how possible evils have been minimized.

Two chapters are devoted to the hedge, which is of paramount importance to dealer, manufacturer, warehouse, and large producer, as a means of price insurance. These chapters present the generally accepted methods of using the hedge to remove business as far as possible from the realm of speculation to a sound merchandising basis.

Auxiliary functions of commodity exchanges may be used to greatest advantage. These functions include the maintenance of grading, weighing and inspection systems, the collection of statistics and the compilation of reports.

H. J. WOLF.

Source Book on Industrial History

History of Manufactures in the United States. Vol. II, 566 pages; Vol. III, 467 pages, 6¼ x 10 in. Published for the Carnegie Institution of Washington by McGraw-Hill Book Co., Inc., New York. Price \$7.50 for each volume.

Volume I of this important, accurate and readable book was reviewed in THE IRON AGE September 12. That book carried the subject up to the outbreak of the Civil War; the second and third volumes, now published, contain respectively an account of the years from 1860 to 1893, and from 1893 to 1928.

The year 1861 is very properly chosen as the beginning of a new industrial era, with great political consequences, as the tendency was manifest that "the earth and the fullness thereof" would accrue to the manufacturing nations, whether great, like America and England, or small like Belgium and Switzerland. Attempts were made to create industrial States by allying industry with government. Specialization along national lines became the rule. America stood alone in consuming the greater part of her products; with Europe it was the converse. America carried labor to materials; Europe, materials to labor. With our Civil War and the lessened and partly improvident home market came the northern manufacturers' need to seek foreign markets; in lumber we slashed our home supply in order to glut the marts abroad.

This period made our factory owners dependent on home resources. At first we were long on domestic copper, but so short on domestic coal that return to wood burning for locomotives was suggested. Our entry into Bessemer steel production was late; ship building became active. Our cotton goods supply, plus Great Britain's, was in excess of world demands; but this stimulated wool manufactures.

In the last volume, the author draws a parallel between the economic and business conditions in the years immediately before the Civil War and the World War. According to him, both conflicts began after long periods of subnormal prosperity, and cites statistics from New England to substantiate the thesis. It would appear that conditions were too spotty to warrant the conclusion; some industries were expanding rapidly and some countries were generally prosperous; in America we had passed through Roosevelt's "trust-busting" and another administration hostile to consolidation and integration of manufacture.

ROBERT GRIMSHAW.

Of Interest to Ocean Shippers

Three recent books on shipping are before us. The first on "Port and Terminal Charges" will be of especial interest to traffic managers, being a comprehensive collection of data prepared by the Corps of Army Engineers and the United States Shipping Board. It may be

had from the Superintendent of Documents, Washington, for \$1. It describes the facilities available for ships at the docks of 65 ports in the States and island possessions, and the costs of handling, storage, cartage and switching. From it one can get a close estimate of the total costs of getting a cargo cleared or landed at a certain port.

Similar data but on a much more detailed plan are contained in a 126-page volume on the Port of Galveston and tributary ports, compiled by the same authorities. It contains a number of inserted maps, tables of statistical matter and photographs showing the wharfage and other elements of value to the shipping trade. The waterborne commerce of Galveston has more than doubled since 1917, about two-fifths of which is coastwise.

A comprehensive analysis of the "American Merchant Marine Problem" is contained in a 167-page volume of that title published by the National Industrial Conference Board, New York. (Price \$2.50.) Recognizing that the policy of the Government must be a determining factor in the success of a merchant marine, this book picks up the other factors entering into the situation and discusses suggested methods for improving the shipping fleet and its service to the carrying trade of the world. So long as a heavy wage differential makes both the construction and the operation of our vessels unduly expensive, American ships are handicapped in competition with more cheaply built and cheaply run ships.

Governmental assistance in overcoming this persistent differential brings up the question of subsidies and subventions, preferential treatment in railroad rates or discriminating duties. The authors conclude that the Shipping Board should withdraw from the field of ship operation. It is suggested that all of the idle tonnage owned by the Government which is unfit for service might be sold or withdrawn from registry, and held for use only in the event of national emergency. Any additional assistance which may be required to maintain essential shipping facilities under the American flag ought to be provided in accord with sound business principles.

Notes on New Books

Standardization activities of almost every major American industry are described in the 1929 American Standards Year Book published by the American Standards Association, New York. In a foreword, Secretary of Commerce Robert P. Lamont points out that the exchange of goods between countries will be facilitated by standardization of international character. As this exchange is perfected there will be an advance in world living standards through the increased division of wealth. Through the application of industrial standardization the economies of mass production are rapidly extending to consumer goods. This results in wider distribution and consumption of many of those things classed as luxuries.

A proper method of controlling material in process depends upon the scope of manufacturing activities to such an extent that the "storekeeper" may be the purchasing agent (where the raw material is the highest portion of the value, as in a brass foundry), the sales manager (as in a jobbing concern where the critical point is sales), or the production manager (where the mass production of a standard object is the aim). In any event, the economical flow of material in process and the maintenance of the necessary reserve is intimately connected with the most economical method of manufacture and allocation of labor and machines. Consequently a series of nine studies on "Material Control and Storeskeeping in Machine Shops and Foundries" (Willis Wissler, 284 pages, 8½ x 11 in., Ohio State University Press, Columbus, Ohio. Price \$2.50) is in reality an intimate study of operations

in representative Ohio factories, ranging from those making electrical equipment to others making steam shovels, and as such will serve as a mine of information for manufacturing executives generally.

More than 150 pages are comprised within the 1927 report of the Dominion Bureau of Statistics dealing with the production of iron and steel in Canada during that year, and the output of a considerable variety of finished products using iron and steel as the raw material. The tables go into considerable detail, as the study is essentially that of a census of manufactures. The number of establishments, employees, payrolls, capital investment, cost of materials, value of products and value added in manufacturing find a comprehensive treatment in this publication. Imports and exports, power employed, fuel and electricity used and many other items are covered in the survey.

American Institute of Steel Construction, New York, has prepared a handsome brochure entitled "The Superiority of the Steel Bridge." A brief introduction points out the main reasons for using steel, viz: Strength, permanence, adaptability and economy. But most of the pages are filled with half-tones of notable steel bridges, notable not for their size but for their beauty of line and an architectural treatment harmonious with the surrounding landscape. It is worthy of remark that the majority of these subjects are from European localities—a fact which is not particularly flattering to American constructors.

"Design Standards for Oxywelded Steel and Wrought Iron Piping" forms the subject of a 68-page pamphlet issued by Linde Air Products Co., New York. It should be of especial value to users of large diameter piping, for it gives detailed drawings of acceptable joints, plugs, branches, turns, headers and anchors, together with notes on the advantages and disadvantages of each design, the ordinary uses, commercial tolerances, and appropriate phraseology for specifications. An appendix includes dimension charts for standard flanges for welding, welding necks, a model general specification for a piping installation and a glossary. A supplementary 86-page pamphlet on "Fabrication of Welded Piping Designs" is intended for the shop men and contains sections on procedure control, template work, and cost data.

New Books Received

Psychology and Industrial Efficiency. By Harold E. Burt. 395 pages, 5½ x 8¼ in., illustrated. D. Appleton & Co., 35 West Thirty-second Street, New York. Price \$3.

Machine Design. By P. H. Hyland and J. B. Kommers. 448 pages, 6 x 9¼ in., illustrated. McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

Modern Aviation Engines. Two volumes. By Victor W. Pagé. 1908 pages, 6½ x 9½ in., illustrated. Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price, for two volumes, \$9, for one \$5.

Edelguss. Edited by G. Meyersberg. 170 pages, 6¼ x 9¼ in., illustrated. Julius Springer, Linkstrasse 23, Berlin, W 9, Germany. Price 11 m.

American Society for Testing Materials. Tentative Standards: 1929. 901 pages, 6 x 9 in., illustrated. American Society for Testing Materials, 1315 Spruce Street, Philadelphia. Price \$8.

General Sales or Turnover Taxation. 204 pages, 6¼ x 9¼ in., illustrated. National Industrial Conference Board, Inc., 247 Park Avenue, New York. Price \$2.50.

Gauges and Fine Measurements. By F. H. Rolt. Vol I, 366 pages; vol. II, 357 pages, 6 x 9 in., illustrated. Macmillan Co., 60 Fifth Avenue, New York. Price \$14.50.

Dullness Prevails in European Centers

Holidays Affect British Activity—Depression in Germany Partly Offset by Export Trade—Russia a Heavy Buyer in Germany

(By Cable)

LONDON, ENGLAND, Dec. 16.

CLEVELAND pig iron producers are benefiting by the reduction of 6d. (12c.) a ton on Durham furnace coke, but are maintaining pig iron prices. The market generally is dull, as domestic consumers are approaching the holidays and the usual stock taking period, and export demand for Cleveland iron is slack.

Hematite furnaces are booked with fair tonnages for first quarter delivery, including a moderate tonnage on Continental account.

Finished steel is quiet, especially for export. Plate and other heavy rolling mills are in need of work.

United Kingdom exports in November were 31,600 tons of pig iron, of which the United States received 2000 tons. Total iron and steel exports were 383,000 tons.

Tin plate is active, with consumers buying for prompt and forward delivery. Works are well sold and prices are likely to advance on an increase in the cost of tin. Galvanized sheets are quiet and prices weak. Black sheets are dull.

Reorganization of Richard Thomas & Co. is expected, following recommendations of the committee appointed to advise on readjustment of the company's capital.

Continental markets are confused, and business difficult to transact. The International Steel Cartel has arranged the first quarter production

quota on a basis of the 10 per cent reduction previously agreed upon. The cartel is also establishing an export sales organization for principal products, which includes pooling of orders among mills to give each an adequate share of business. The Charleroi conference of cartel delegates has agreed on minimum f.o.b. prices, but it is now claimed here that sellers are willing to accept lower than these quotations.

The minimum fixed prices are,

blooms £4 3s. (\$20.25), billets £4 11s. (\$22.20) and £4 12s. (\$22.45), sheet-bars £4 11s. (\$22.20) and £4 13s. (\$22.69), merchant bars £5 6s. (1.15c. per lb.) to consumers and £5 5s. (1.14c. per lb.) to merchants, normal shapes £5 (1.09c. per lb.) to consumers and £4 19s. (1.08c. per lb.) to merchants, special shapes £5 1s. (1.10c. per lb.) and £5 2s. (1.11c. per lb.), plates, ¼-in., £6 4s. (1.35c. per lb.), 3/16-in. plates, £6 6s. 6d. (1.37c. per lb.).

German Home Trade Depressed

Steel and Machinery Exports Large and Production For Year May Establish New Post-War Record

BERLIN, GERMANY, Dec. 2.—General business conditions are unsatisfactory, and the usual winter increase in unemployment has been more rapid than a year ago, with the total unemployed estimated at more than one million. Business failures have increased, and in one month 30 small private banks suspended payment. Coal production is larger and the textile and leather industries, which have been depressed, show evidence of improving.

These conditions in the domestic market are, in part, offset by greater export trade, and the past three months have shown an export surplus

over imports. This tends to prove that, when Germany ceases borrowing abroad, as has been the case recently, the country can meet its foreign obligations, including reparations payments and loans from the United States, through an active trade balance. The improvement in export trade has not extended to the steel market, where prices have been declining. As a result, the Ingot Steel Syndicate has again increased its rebates to exporting manufacturers and for December is allowing, per metric ton, 16 m. (\$3.82) on ingots, 21 m. (\$5) on billets and slabs, 36 m. (\$8.60) on structural shapes, 34 m.

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.88

British Prices f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3 12½s. to £3 13½s.	\$17.69 to \$17.93
East Coast hematite...	4 0 to 4 1	19.52 to 19.76
Perronmanganese, export	12 5 to 13 0	59.42 to 63.05
Billets, open-hearth...	6 2½ to 6 5	29.89 to 30.50
Sheet bars, open-hearth	6 0 to 6 5	29.28 to 30.50
Black sheets, Japanese specifications	12 10	61.00
Tin plate, per base box	0 18¾ to 0 19	4.57 to 4.64
Rails, 60 lb. and heavier	7 15 to 8 15	37.59 to 42.43
Cents per Lb.		
Steel bars, open-hearth.	7 15 to 8 10	1.69 to 1.85
Beams, open-hearth...	7 2½ to 7 12½	1.55 to 1.66
Channels, open-hearth...	7 7½ to 7 17½	1.60 to 1.72
Angles, open-hearth...	8 2½ to 8 12½	1.77 to 1.87
Ship plates, open-hearth	7 12½ to 8 2½	1.66 to 1.77
Black sheets, No. 24 gage	10 0 to 10 5	2.18 to 2.23
Galvanized sheets, No. 24 gage	12 10 to 12 12½	2.72 to 2.75

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3 7s. to £3 11½s.	\$16.35 to \$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3 6 to 3 8	16.11 to 16.59
Billets, Thomas	4 11 to 4 12	22.20 to 22.45

Sheet bars, Thomas...	4 11 to 4 13	22.20 to 22.69
Wire rods, low C., No. 5 B.W.G.	6 3 to 6 5	30.01 to 30.50
Rails, 60 lb. and heavier	6 8½ to 6 10*	31.35 to 31.72
Rails, light	6 1½	29.65
Cents per Lb.		
Steel bars, merchant...	5 4 to 5 6	1.13 to 1.15
Steel bars, deformed...	5 3 to 5 5	1.12 to 1.14
Beams, Thomas, British standard	5 1 to 5 2	1.10 to 1.11
Channels, Thomas, American sections...	5 10 to 5 17	1.19 to 1.27
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 0 to 5 6	1.09 to 1.15
Angles, Thomas, 3-in.	5 6	1.15
Ship plates open-hearth inspected	7 5	1.58
Black sheets, No. 31 gage, Japanese	12 3 to 12 4	2.47 to 2.66
Hoop and strip steel over 6-in. base	5 11½ to 5 12½	1.21 to 1.22
Wire, plain, No. 8 gage	7 2½ to 7 3½	1.55 to 1.56
Wire, galvanized, No. 8 gage	8 12½ to 8 15	1.87 to 1.90
Wire, barbed, 4-pt. No. 12 B.W.G.	11 4 to 11 6	2.44 to 2.46
Wire nails, base	0 6¼	\$1.55 per keg
Wire nails, assortments 1 to 6-in. keg	10 6½	2.69

*Open-hearth steel, 8s. (\$1.94) per ton extra.

(\$8.13) on bars, 42 m. (\$10.04) on bands, 21.50 m. (\$5.14) on wire rods and 28 m. (\$6.69) on heavy-gage sheets.

The refunds to exporting manufacturers are materially aiding such industries to compete for foreign trade with the United States. The cabinet, despite a socialist and free-trade chancellor, is decidedly protectionist in its attitude and among other tariff increases has decided to impose a duty of 250 m. a ton (2.70c. per lb.), on aluminum ingots, at present duty free.

Steel production this year will materially exceed output in 1928 and, with the present rate maintained to the end of December, it should be greater than in 1927, the largest post-war year. From January to October inclusive, steel ingot production was 13,801,328 metric tons, compared with 13,068,045 metric tons in the 10 months of 1928. Production of rolled products was 9,615,349 tons, compared with 9,418,051 tons in 10 months of 1928.

Exports of iron and steel are large, and imports and exports of pig iron have been about equal since spring. The scrap market here is dull, but there is considerable interest in the large increase in scrap exports from the United States, a part of which has been reaching Germany since 1925. In that year only 2 tons of scrap was received from the United States, but in 1928 imports from the United States reached a total of 18,984 tons and in the first seven months of this year were 16,681 tons.

Export sales of machinery and metal goods of nearly all kinds are gaining. Record shipments of certain products were made in October. Germany is increasingly competing in the fields which have been completely dominated by American equipment, such as tabulating machines, typewriters, talking machines and other fine manufactures. A comparison of machinery exports in the first nine months of 1929 with preceding years shows 54,333 machines, valued at 7,430,000 m. (\$1,775,770), shipped in nine months of 1926; 40,105 machines, value at 7,399,000 m. (\$1,768,361), shipped in 1927; 54,396, valued at 10,134,000 m. (\$2,422,026), shipped in 1928; and 73,077, valued at 14,769,000 m. (\$3,527,791), shipped in the nine months of this year.

Wire Rod Cartel Raises Tonnage Quota

WASHINGTON, Dec. 14.—At the meeting of International Wire Rod Cartel, Nov. 14, in Düsseldorf prices were left unchanged for the first quarter of 1930, but, in view of an improved market, the tonnage quota was increased from 440,000 metric tons to 475,000 tons. Extension of the cartel beyond April, 1930, was discussed without apparent decision, says a report from Paris to the Department of Commerce.

British Output Less in November

LONDON, ENGLAND, Dec. 13. (By Cable).—Pig iron output of Great Britain in November was 631,400 gross tons and that of steel ingots and castings was 815,000 tons. These are the lowest figures for several months, whereas October showed the highest production of the year, in both items.

Comparison of recent output with other periods shows that 1929 has provided a higher tonnage, both in pig iron and in steel, than Great Britain has experienced in some years.

	Pig Iron, Gross Tons	Steel Ingots and Castings, Gross Tons
1913—Av. monthly..	855,000	638,600
1920—Av. monthly..	669,500	755,600
1922—Av. monthly..	408,500	490,100
1923—Av. monthly..	620,000	706,800
1924—Av. monthly..	609,900	685,100
1925—Av. monthly..	519,700	616,400
1926—Av. monthly..	203,500	296,700
1927—Av. monthly..	607,800	758,200
1928—Av. monthly..	550,900	710,400
1929—Av. first half..	599,600	813,800
1929—August	682,000	753,300
1929—September	664,600	847,900
1929—October	688,700	889,800
1929—November	631,400	815,000
1929—Av. 11 months	630,100	817,500

German Works Dismantles Puddled Iron Plant

HAMBURG, GERMANY, Dec. 2.—The Vereinigte Stahlwerke A. G., Düsseldorf, is beginning to dismantle its only remaining plant producing puddled iron, the Siegerlandische Abteilung Ax. The last puddled iron will be produced during the first week of December. Two blast furnaces at the plant will also be dismantled.

To Get French Export and Import Tonnages

Announcement has been made by the Iron and Steel Division, Department of Commerce, that, as a result of efforts of Trade Commissioner Thomas Butts of the Paris office, it will receive from the Comité des Forges de France monthly figures on exports and imports, divided into principal classes of products.

Large German Mills Had Profitable Year

HAMBURG, GERMANY, Dec. 2.—Improved methods in management and administration of German plants have apparently contributed to greater profits this year. Most of the larger steel companies are declaring higher dividends, despite the lockout in the fall of 1928 and the slow improvement in business this year. The Rheinmetall A. G., Klockner works, Hoesch Steel Co. and Gutehoffnungshütte are all paying higher dividends, but the smaller companies as a rule are reducing their dividends 25 to 75 per cent, or are passing them. It is suggested in some

quarters that 1930 may see the absorption of many small companies by the leading steel producers. In fact, there are a number of unconfirmed reports of negotiations with that end in view.

Continental Rivets for Export

HAMBURG, GERMANY, Dec. 2.—Competition for rivet business is keen, especially in the export field, where foreign competition is strong. Quotations on 3/8-in. to 1-in. pan, cup, or round head rivets is now about £8 15s. per ton (\$1.91 per 100 lb.) and for 1/2-in. rivets £10 10s. to £10 15s. per ton (\$2.28 to \$2.34 per 100 lb.), f.o.b. Hamburg or Antwerp, packed in double gunny sacks.

Russia Buying Heavily from Germany

HAMBURG, GERMANY, Dec. 2.—Purchases of iron and steel products by the U. S. S. R. continue large. A recent contract placed with the Katowitz A. G. für Bergbau und Hüttenwesen in Upper Silesia calls for steel plates, shapes and wire, to a total value of about 26,000,000 m. (\$6,188,000). Under the contract the tonnage may be increased by 50 per cent.

Niles Works in Germany Acquires Two Companies

HAMBURG, GERMANY, Dec. 2.—The Deutsche Nileswerke A. G. of Berlin, controlled by the Niles Tool Works in the United States, has absorbed the Reis & Martin A. G. and Max Hasse & Co., manufacturers of machine tools. The company has declared a dividend of 6 per cent and reports that business, especially for export, has been much larger than in 1928. It has orders on its books for the next four to five months.

Rail Agreement Protested

HAMBURG, GERMANY, Dec. 2.—Rail mills in Belgium and Luxemburg have entered a formal protest with the International Rail Makers' Association against the agreement between Great Britain and Argentina under which the latter will buy British rails exclusively.

Smokeless Diesel Locomotive

HAMBURG, GERMANY, Dec. 2.—A new type of Diesel-engine locomotive, said to be entirely smokeless, has been developed by the Maschinenfabrik Augsburg, Nuremberg, and is being tested by the German railroads. The locomotive develops 1200 hp. and is equipped to absorb all smoke from oil burning.

Machinery Markets and News of the Works

Machine Tool Sales Lag

Substantial Volume of Inquiries Taken as Forerunner of Good January Business

ALTHOUGH the machine tool industry is feeling the effects of the usual year-end lull in buying and of the hesitancy on the part of users to make further major purchases until the future trend of business can be better appraised, sales have been fair in volume and in some centers have exceeded those in December, 1928.

Both manufacturers and dealers find encouragement in the substantial amount of inquiries now before the trade, predicting that a large percentage will be converted into orders early in 1930. If indications in January point to an expansion in business activities, there is little doubt that machine tool bookings will turn upward.

The Maytag Co., Newton, Iowa, has completed the purchase of \$175,000 worth of tools, while the Caterpillar

Tractor Co., Peoria, Ill., is contracting for machine tools and foundry equipment. The Electric Auto-Lite Co., Toledo, which is building a large extension for the manufacture of automobile lighting and starting equipment, has placed six machines with a Cleveland dealer and will buy considerable more equipment.

The machine tool orders index of the National Machine Tool Builders' Association stood at 178.7 in November, compared with 322.2 for October and 290.4 for November, 1928. The severe drop carried the three months' average trend of the association's index curve down to the lowest point for the year at 247.2 and, in fact, the lowest point since August, 1928.

Shipments in November, however, were somewhat less than in October so that the industry still has more than two months' unfilled orders.

New York

NEW YORK, Dec. 17.—Although buying of machine tools this month has dropped below the November rate, the volume is larger than in December, 1928. Machine tool business in this district has declined to a smaller extent than had been expected. Prospects for the first quarter of 1930 continue to be encouraging. A considerable number of inquiries are pending, and it is expected that a good deal of this business will be closed in January if indications then point to an upward trend in business activity.

Crest Mfg. Co., Inc., 108 West Twenty-fifth Street, New York, manufacturer of plumbing and heating equipment, has leased three-story factory at Long Island City for new plant, and will remove to new location.

Department of Parks, Arsenal Building, Central Park, New York, has plans for two one-story equipment service, repair and storage buildings, 30 x 115 ft., at Long Island City, to cost about \$70,000 with equipment.

Erle Railroad Co., 50 Church Street, New York, plans rebuilding of wheel shops and other service buildings at re-

pair plant at Port Jervis, N. Y., destroyed by fire Dec. 9.

Battery Operating Co., 49 West Sixty-sixth Street, New York, has plans by Julius Eckmann, 155 East Forty-second Street, architect, for a six-story automobile service, repair and garage building, to cost about \$100,000 with equipment.

R. Hoe & Co., Inc., East River and 138th Street, New York, manufacturer of printing presses and parts, saws, etc., has filed plans for three-story addition, 79 x 137 ft., to cost about \$125,000 with equipment. Frank S. Parker, 119 West Fifty-seventh Street, is architect and engineer.

National Lead Co., 111 Broadway, New York, has formed National Lead Co. of Canada, Ltd., a subsidiary, to take over and consolidate several properties in Dominion. New company will be affiliated with Hoyt Metal Co. of Canada, Ltd., Montreal, also a subsidiary of parent organization. Company is capitalized at \$5,000,000. W. C. Beschorman, vice-president of parent organization, will be president of Canadian company.

I. Kallich, 26 Court Street, Brooklyn, architect, will soon take bids for a multi-story automobile service, repair and garage building at Coney Island Avenue and Quentin Road, to cost about \$130,000 with equipment.

Toledo Scale Co., Toledo, Ohio, has leased floor in building now in course of erection at 801 Second Avenue, totaling 7500 sq. ft. floor space, for new factory branch and service department.

Pilot Radio & Tube Corporation, 323 Berry Street, Brooklyn, manufacturer of radio tubes and equipment, is arranging for consolidation of all plants at Lawrence, Mass., where local mill, totaling 1,500,000 sq. ft. floor space, was recently taken over.

John A. Marshall, Yonkers, N. Y., and Herbert Peterson, Woodhaven, L. I., have organized General Tin Industries, Inc., with capital of 2,500,000 shares of stock, no par value, and plan early establishment of plant in this vicinity; a metal and ore-treating unit will form part of new works.

Consolidated Instrument Co. of America, Inc., 305 East Forty-seventh Street, New York, has taken over property of Connecticut Telephone & Electric Co., Meriden, Conn., manufacturer of telephone apparatus, electrical instruments, etc., with two plants, both of which will be continued by new owner, which will operate Connecticut company as separate division. Company is also negotiating for a plant on Pacific Coast, and will carry out an expansion in that district. Herbert E. Linden is vice-president.

E. T. Cunningham, Inc., 370 Orange Street, Newark, manufacturer of radio tubes and equipment, has leased part of six-story factory at Johnson and Hillside Avenues and Peddle Street for a branch plant. Present works will be continued and, with new plant, about 60,000 sq. ft. of space will be used for production and distribution.

Positive Lock Washer Co., Avenue A, Newark, has taken bids for a two-story addition, to cost more than \$40,000 with equipment. Raymond B. Platt, 600 Bloomfield Avenue, Bloomfield, N. J., is architect.

Engraving & Engine Turning Co., Newark, recently organized by Oscar A. Von Buckow, has leased space at 149 Mulberry Street for a metal turning and etching works.

Board of Township Commissioners, Municipal Building, North Bergen, N. J., will take bids at once for three-story automobile service, repair and garage building, 90 x 112 ft., to cost about \$140,000 with equipment. R. B. Glenn, address noted, is architect and engineer for board.

Alfred Hofmann, Inc., 629-35 Fifteenth Street, West New York, N. J., manufacturer of knitting machinery and parts, has superstructure under way for two-story addition, 103 x 125 ft., to cost over \$60,000 with equipment. Lockwood Greene Engineers, Inc., 1 Pershing Square, New York, is architect and engineer.

Felco Mfg. Co., Inc., 17 William Street, Newark, manufacturer of steel cabinets, etc., has leased a two-story factory at Bloomfield, N. J., for new plant, and will remove to new location and increase capacity.

Buffalo

BUFFALO, Dec. 16.—United States Gypsum Co., 300 West Adams Street, Chicago, manufacturer of wallboard, cement plasters, gypsum lath, etc., has purchased Niagara Gypsum Co., Oakfield, N. Y., with plant adjoining a branch mill of purchasing company. New owner will consolidate acquired interest with organization, and will organize Niagara & Peerless Division for expansion in Oakfield district.

Camillus Cutlery Co., Camillus, N. Y., is considering erection of an addition, to cost about \$40,000 with equipment.

Niagara Lead Co., Mill Street, East Lockport, N. Y., is planning replacement of part of mill destroyed by fire Dec. 12, with loss of about \$60,000 including equipment. It is proposed to lease an existing factory for manufacture. Charles A. Johnson is president.

Marco Pagano, 32 Decker Street, Buffalo, and associates have organized M-P Metal Casting Co., with capital of \$25,000, and plan operation of foundry for production of metal toys, novelties, etc. Eugene E. Burger, 200 LaSalle Street, is interested in new company.

A. & J. Mfg. Co., Binghamton, N. Y., manufacturer of kitchen tools and equipment, is considering one-story addition to plant on Noyes Island, to cost more than \$50,000 with equipment. Company is affiliated with Edward Katzinger Co., 1949 North Cicero Avenue, Chicago, manufacturer of bakers' and confectioners' machinery, tinware, etc. E. H. Johnson is local manager.

Roy W. Whipple, 99 Oak Street, and Thornton D. Whipple, 46 Laurel Avenue, Binghamton, have organized Whipple's, Inc., with capital of \$400,000, to operate a local plant for manufacture of automobile equipment and accessories.

Universal Bearing Metals Corporation, Rochester, N. Y., manufacturer of bearing bronze and bearing alloys, has bought assets, processes and patents of Bearing Bearings, Inc. Operating and sales force of latter will not be changed. E. P. Langworthy is president of Universal company.

Wright-Hibbard Industrial Electric Truck Co., Inc., Phelps, N. Y., is about to increase production by installation of new equipment involving an expenditure of about \$50,000. Company desires representatives in different states who are familiar with material handling equipment, especially industrial electric trucks.

Philadelphia

PHILADELPHIA, Dec. 16.—Bids have been asked on general contract by Swift & Co., Ninth Street and Girard Avenue, Philadelphia, meat packers, for a three-story and basement addition, to cost over \$85,000 with equipment. Company engineering department is in charge. Headquarters are at Chicago.

Philadelphia Rapid Transit Co., Mitten Building, Philadelphia, plans new shops on property recently acquired by Transit Land Co., a subsidiary, to cost more than \$85,000.

Shell Eastern Petroleum Products Co., Elverson Building, Philadelphia, has taken over former plant of Philadelphia Rubber Works, 600 x 800 ft., as site for storage and distributing plant, to cost about \$125,000 with equipment. Headquarters are at 122 East Forty-second Street, New York.

The Crane Market

ESTIMATING inquiries for use in making appropriations for next year continue to accumulate from the railroads and large industrial users of cranes. Although formal inquiries for overhead equipment have decreased this month, some projects, which have been pending for a number of weeks, have been revived. New business includes a number of small capacity overhead cranes. Contractors bidding for a project of the Westchester County Sanitary Sewer Commission, Yonkers, N. Y., have been obtaining prices on a 5-ton, 60-ft. span, 3-motor overhead crane and a 3-ton, 49-ft. span, grab bucket crane. Railroads have been especially active in seeking estimates on the cost of locomotive cranes for use in making 1930 budgets. The Boston & Albany Railroad, Boston, is about to close on a 20-ton locomotive crane.

Among recent purchases are:

Lebanon Steel Foundries, Lebanon, Pa., two 7½-ton, 50-ft. span overhead cranes, and a 3-ton, double-hook, high-speed electric hoist from Shepard Niles Crane & Hoist Corporation.

Levering & Garrigues Co., 552 West Twenty-third Street, New York, 10-ton, 75-ft. span crane for yard service at Dunellen, N. J., from Milwaukee Electric Crane & Mfg. Corporation.

United States Rubber Co., Providence, R. I., 15-ton and 5-ton electric traveling cranes from unnamed builder.

Congdon & Carpenter, Providence, R. I., 3-ton, 52-ft. span and 5-ton, 67-ft. span electric cranes from Shepard Niles Crane & Hoist Corporation.

General Electric Co., Lynn, Mass., 3-ton overhead electric crane, reported purchased from Shepard Electric Crane & Hoist Corporation.

Gimbel Brothers, Ninth and Market Streets, Philadelphia, will soon take new bids on revised plans for a two-story automobile service, repair and garage building for company motor trucks and cars, to cost \$170,000 with equipment. Abbott, Merkt & Co., 178 Fifth Avenue, New York, are architects.

Philadelphia Electric Co., Ninth and Sansom Streets, Philadelphia, has plans for one-story equipment storage, repair and distributing plant at West Conshohocken, Pa., to cost about \$60,000 with equipment. United Engineers & Constructors, Inc., 112 North Broad Street, Philadelphia, is architect and engineer.

Board of Education, Administration Building, Allentown, Pa., is considering installation of manual training equipment in three-story addition to Raub junior high school, to cost about \$225,000, for which bids will be asked on general contract early next year. Jacoby & Everett, Commonwealth Building, are architects.

Coatesville Boiler Works, Inc., Coatesville, Pa., is planning one-story addition to foundry in Drumpeller district, to cost more than \$75,000 with equipment.

Harrisburg Railways Co., Harrisburg, Pa., is planning expansion program to cost about \$350,000, including track work, shop facilities, etc.

Susquehanna Pipe Line Co., care of J. Howard Pew, Ardmore, Pa., recently formed by Mr. Pew and associates, has applied for permission to construct and operate a pipe line from Elizabethtown

to York, Pa., including establishment of oil storage and distributing plant to connect with system. Frank Cross, Merchantville, N. J., is also interested in new company.

New England

BOSTON, Dec. 16.—Dealers' sales of machine tools the past week were again quite limited. No new inquiries of importance have developed, and buying on old prospects apparently has been put off until after Jan. 1. The majority of New England machine tool builders have sufficient backlogs to keep plants on current operating schedules through the first quarter.

New England Smelting Works, Inc., West Springfield, Mass., is arranging for new plant to replace one recently destroyed by fire.

National Service Co., Fall River, Mass., early next year will build an artificial ice making plant for which miscellaneous equipment will be purchased.

Manning-Bowman & Co., Meriden, Conn., have plans for a new factory to be erected early next year.

Malden Machine Tool Co., Malden, Mass., closed bids last week for a machine shop, to cost \$30,000 without equipment.

M. H. Barland Steam Engine Co., Providence, R. I., will start work at once on a one-story plant, 50 x 60 ft.

Central Maine Power Co., Augusta, Me., has engaged J. C. & J. M. Stevens, architects, to draw plans for a power station at Bingham.

Boston & Albany Railroad Co., South Station, Boston, has awarded general contract to J. F. Fitzgerald Construction Co., 38 Chauncy Street, for power plant at Beacon Park, Allston, to cost about \$85,000. Densmore, LeClear & Robbins, 31 St. James Avenue, Boston, are architects.

Newark Rivet Works, 262 Lafayette Street, Newark, N. J., has purchased wire goods department of Bassett Metal Goods Co., Shelton, Conn., which sold its metal bag frame division to same company about six months ago. Purchasing organization will operate both departments at present location and will carry out expansion later.

G. & O. Mfg. Co., 138 Winchester Avenue, New Haven, Conn., manufacturer of automobile radiators, has asked bids on general contract for a two-story addition, 40 x 100 ft., for manufacture of aircraft radiators, to cost about \$45,000 with machinery. Westcott & Mapes, 139 Orange Street, are architects and engineers.

Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, has plans for addition to storage and distributing plant at Portland, Me., with cold storage and refrigerating facilities, mechanical handling and elevating equipment, to cost \$170,000 with equipment.

Storts Welding Co., South Colony and Hanover Streets, Meriden, Conn., is considering one-story addition, to cost more than \$30,000 with equipment, work to begin in spring. R. J. Tierney is general manager.

George Lawley & Sons Corporation, operating a shipyard and repair plant at Dorchester, Boston, plans rebuilding part of shops destroyed by fire Dec. 10, with loss estimated close to \$100,000 including equipment.

Cadillac Providence Co., 9 Federal Street, Providence, R. I., has asked bids

on general contract for two-story service, repair and sales building, to cost \$140,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

Pittsburgh

PITTSBURGH, Dec. 16.—The machinery business has not changed materially the past week and is very quiet with most dealers. December ordinarily is not a good month with many of them and this year is no exception. A few single tools are being placed, but new inquiries are not coming out in any volume and not much of the business now being figured will be placed before the first of the year. The Norfolk & Western closed for one or two tools the past week and is expected to be a heavier buyer within the next few weeks. The Baltimore & Ohio has not yet closed on the tools it has under inquiry, but the business is said to be settled. The fourth quarter list of the Westinghouse Electric & Mfg. Co. is now practically concluded, but a new list will appear in a short time.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has awarded general contract to Public Service Production Co., Public Service Terminal, Newark, N. J., for initial unit of new factory branch, storage and distributing plant near Port Newark, to cost over \$600,000 with equipment. Other structures will be built later to bring investment to more than \$5,000,000. Company recently acquired 20 acre tract at location noted.

United Engineering & Foundry Co., Farmers' Bank Building, Pittsburgh, manufacturer of iron and metal-working machinery, is carrying out an improvement and modernization program at branch plant at Canton, Ohio, to include installation of additional equipment.

Oliver Iron & Steel Corporation, 1001 Muriel Street, Pittsburgh, has awarded general contract to Pihl & Miller, Wabash Building, for one-story addition, to cost about \$40,000 with equipment.

Pittsburgh & Lake Erie Railroad Co., P. & L. E. Terminal Building, Pittsburgh, is asking bids until Dec. 27 for 6600 pieces of seamless steel tubing. J. H. James is purchasing agent.

Harpers Ferry Electric & Power Co., Harpers Ferry, W. Va., is arranging for expansion to cost about \$250,000, including increase in power facilities, transmission lines and power substations.

J. H. France Refractories Co., Snow Shoe, Pa., will soon begin work on new plant at Falls Creek, Pa., consisting of main one-story kiln building, 100 x 450 ft.; mixing unit, 30 x 40 ft.; press building, 20 x 60 ft.; storage and other buildings, to cost about \$325,000 with equipment.

Detroit

DETROIT, Dec. 16.—Standard Tube & Mfg. Co., 2435 Scotten Street, Detroit, manufacturer of metal tubing and kindred products, is considering new one-story plant at Ferndale, Mich., to cost more than \$50,000 with equipment.

Hayes Body Corporation, Grand Rapids, Mich., has plans for a one-story addition, 175 x 565 ft., for stamping metal bodies, to cost \$250,000 with equipment. Fett, Pearson & Goffeney, Associates Building, South Bend, Ind., are architects.

Oliver Machinery Co., Grand Rapids, manufacturer of wood-working machinery, has purchased Eaglefield Link Co., 1454 East Nineteenth Street, Indianapolis. It is understood that operations will be continued at Indianapolis plant for time being.

Ann Arbor Railroad Co., Ann Arbor, is planning to rebuild part of car repair works at Owosso, including coach repair shop, recently destroyed by fire, with loss of more than \$100,000 including equipment.

Bellevue Industrial Furnace Co., 2971 Bellevue Avenue, Detroit, has plans for one-story addition, 80 x 165 ft., to cost about \$50,000 including equipment. C. L. Phelps, Detroit Savings Bank Building, is architect.

Gifford Engine Co., Lansing, manufacturer of bushings and kindred equipment, contemplates expansion and installation of additional equipment. Company is arranging for change of name to Gifford Engineering Co.

Mueller Brass Co., 1925 Lapeer Street, Port Huron, manufacturer of brass, copper and other metal products, is considering one-story addition, to cost over \$50,000 with equipment.

St. Joseph Electric Steel Castings Co., St. Joseph, is planning expansion program, including installation of facilities for production of stainless steel specialties, to cost more than \$65,000 with equipment.

Detroit Edison Co., 2000 Second Avenue, Detroit, has disposed of a bond issue of \$13,516,000, part of proceeds to be used for extensions and improvements in generating plants and transmission lines.

Homer Furnace Co., Coldwater, manufacturer of furnaces, iron castings, etc., is considering one-story addition to cost about \$100,000 with equipment. Part of expansion will replace recent fire loss.

Board of Wayne County Commissioners, Detroit, will begin construction of new hangar at municipal airport, including installation of repair and reconditioning facilities, to cost about \$325,000 with equipment.

Swope-McCracker Co., 7720 Gratiot Avenue, Detroit, and Walter Machine Co. have consolidated and are now operating as Walter Machine & Screw Co. at 500 Bellevue Street.

Hydraulic Hoist & Body Co., Detroit, has awarded general contract for an addition which will provide 44,000 sq. ft. additional floor space.

South Atlantic

BALTIMORE, Dec. 16.—F. G. Schenuit Rubber Co., 1200 Mount Royal Avenue, Baltimore, manufacturer of tires, etc., has awarded general contract to A. Kratz & Son, 118 South Carrollton Avenue, for rebuilding of two-story plant, recently destroyed by fire, to cost about \$100,000 with equipment. Frank G. Schenuit is president.

In connection with an expansion program to cost \$7,500,000, Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, plans extensions in gas generating and distributing lines to cost about \$1,000,000. Fund of \$500,000 will be used for additions and betterments in central steam-heating system in downtown district. Majority of remainder of appropriation will be used for extensions in electric light and power plants and system.

Board of Trustees, Loyola College, Evergreen Street and Charles Avenue,

Baltimore, has plans for new three-story engineering building, to cost about \$160,000 with equipment. L. R. White, Hearst Tower Building, is architect.

Standard Oil Co. of New Jersey, Montgomery Building, Spartanburg, S. C., is considering extensions and improvements in local oil storage and distributing plant, to cost about \$75,000; a new one-story unit will be built, 60 x 100 ft., and pumping plant installed. Headquarters are at 26 Broadway, New York.

Universal Roofing Co., Rome, Ga., is planning extensions and improvements, including installation of equipment, to double present output, to cost more than \$35,000.

Tyler Resilient Tire & Tube Corporation, 216 Schley Street, Cumberland, Md., is contemplating new plant at North Baltimore, where 60-acre tract has been secured, for production of recently-patented type of automobile tire, to cost over \$100,000 including machinery.

City Council, Anderson, S. C., has authorized purchase of airport of Welch Aircraft Co., for municipal airport in future. Expansion is planned, including additional hangars, repair and reconditioning facilities, etc. A fund of \$75,000 has been approved for project.

Potomac Electric Power Co., Fourteenth and G Streets, Washington, is arranging for expansion to total about \$8,400,000, of which about \$2,500,000 will be used for an addition to Bannings steam-operated electric generating plant. Work will include new power substation on Columbia Road and extensions in other such stations, to cost about \$600,000 with equipment; construction of new multi-story service, operating and office building, to cost about \$2,600,000, unit to include complete mechanical and electrical repair departments, meter shop, etc.; and extensions in transmission lines and distributing system to cost about \$2,100,000.

Chicago

CHICAGO, Dec. 16.—New orders for machine tools are tapering sharply as the holiday season and end of the year approach. Dealers, accustomed to finding this a dull season, are hopeful that much pending business will be placed early in the new year. This is based on the fact that many quotations on machine tools are in the hands of buyers and the shaping of several large projects seems definitely assured. Deliveries are taking a sharp turn for the better. Fewer orders, combined in some cases with expansions in machine tool manufacturing facilities, are bringing this about.

Maytag Co., Newton, Iowa, has made the last purchases against a list which called for \$175,000 worth of equipment. The Caterpillar Tractor Co., Peoria, Ill., is buying machine tools and foundry equipment and the Allis-Chalmers Mfg. Co., Milwaukee, is asking for prices on a few tools for expansion at its Springfield, Ill., tractor plant.

Pheoll Mfg. Co., Chicago, maker of machine screw products, will erect an addition 80 x 300 ft., three stories and basement. A. S. Alschuler, architect.

United Autographic Register Co., Chicago, will erect a new plant containing about 100,000 sq. ft. floor space, to cost \$1,000,000. Frank D. Chase, Inc., is architect.

Wagner-Langemo Co., Minneapolis, manufacturer of threshers, has been purchased by Deere & Co., Moline, Ill.

T. Godwin, owner of G. & F. Mfg. Co., Exira, Iowa, maker of farm yard equipment, will erect a new one-story factory, 150 x 200 ft., at Council Bluffs, Iowa, and transfer activities there as soon as building is completed.

Liquid Carbonic Corporation, 3112 South Kedzie Avenue, Chicago, manufacturer of carbonating and bottling machinery, etc., plans expansion to cost more than \$1,000,000. It is proposed to establish new plant units at Los Angeles and Seattle, and to make extensions in plants at Chicago, Long Island City, Boston, Philadelphia and Cincinnati, with installation of additional equipment. W. A. Brown is president.

Packard Motor Car Co., 1580 West Grand Boulevard, Detroit, has plans for three-story service, repair and sales building at Chicago, to cost over \$125,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

Board of Park Commissioners, Cutting Building, Joliet, Ill., has plans for new hangar at municipal airport, with repair and reconditioning facilities, to cost about \$55,000 with equipment. Glenn G. Paul is secretary.

Northwest Paper Co., Cloquet, Minn., has plans for two-story addition, installation to include paper-making machine, heaters and auxiliary equipment, to cost over \$175,000. Jacobson Engineering Co., Plymouth Building, Minneapolis, Minn., is engineer. H. S. Hornby is president.

Iowa Railway & Light Co., Cedar Rapids, Iowa, is considering hydroelectric generating plant on local site, to cost about \$1,750,000 with transmission system. Company engineering department is in charge.

Chicago, Burlington & Quincy Railroad Co., 547 West Jackson Boulevard, Chicago, is planning an addition to triple capacity of stock car building plant at Omaha, Neb., to cost more than \$350,000 with equipment. It is also proposed to carry out extensions in box-car manufacturing plant at Lincoln, Neb., and develop facilities for manufacture of a new type of box car, to cost more than \$200,000.

United Air Cleaner Co., 9705 Cottage Grove Avenue, Chicago, manufacturer of automobile equipment, air-cooling systems, etc., is planning to rebuild part of plant recently destroyed by fire.

Naylor Pipe Co., 1230 East Ninety-second Street, Chicago, manufacturer of iron pipe, etc., has awarded general contract to A. T. Herlin & Sons, 6816 Clyde Avenue, for one-story addition, 70 x 198 ft., to cost about \$35,000 with equipment. Abell-Howe Co., 53 West Jackson Boulevard, is architect.

Milwaukee

MILWAUKEE, Dec. 16.—A large amount of pending business is scheduled to be closed during January. Plant construction, in accordance with previously announced programs, will go ahead as soon as weather permits and orders for machine tools and other equipment will probably be placed early next year. The present volume of inquiries and orders is considered normal for this time of year, with current bookings mostly for single machines. Agricultural implement manufacturers report increases in dealers' contracts and have advanced production schedules ahead of dates in recent years.

Allis-Chalmers Mfg. Co. announce that no extensive purchases of machine tools for Monarch tractor division at Springfield, Ill., are planned for the present, but that it may be in the market late in spring.

Northwestern Fuel Co., Milwaukee, subsidiary of Consolidation Coal Co., New York, has purchased 10 acre tract on Twelfth Street, and will build new docks.

Globe-Union Mfg. Co., 14-18 Keefe Avenue, Milwaukee, manufacturer of storage batteries, electrical and radio supplies, has let contracts to Worden-Allen Co. for an addition, one-story, 150 x 320 ft., to cost \$100,000.

Board of Vocational Education, Racine, Wis., is taking bids until Dec. 26 for three-story vocational school, 68 x 128 ft., to be first of several units, to cost \$1,000,000. Frank J. Hoffman, James Block, is architect and T. S. Rees, director.

Nelson Machinery Co., 131 North Pearl Street, Green Bay, Wis., is building a one and two-story addition, 35 x 81 ft.

John Hoell & Co., 7225 Roosevelt Street, Green Bay, Wis., is erecting one-story machine shop, 40 x 60 ft.

City of Oconto, Wis., has acquired property for waterworks improvements to include deep-well pumps with electric drive and standpipe, to cost about \$40,000. Gordon & Balot, 53 W. Jackson Boulevard, Chicago, consulting engineers, are completing plans. P. T. Meeuwse is city clerk.

Little Wolf Power Co., New London, Wis., has plans by L. A. DeGuere, consulting engineer, Wisconsin Rapids, Wis., for a new 1250-hp. hydroelectric generating plant on Little Wolf River.

County Highway Commission, Iron Mountain, Mich., has let contracts for service shop and warehouse and is taking bids on one electric crane, but will defer purchase of tools until after Jan. 1. C. I. Israelson is County engineer.

Julius Andrae & Sons Co., electrical equipment supplies, with headquarters in Milwaukee and closely affiliated with Westinghouse Electric & Mfg. Co., Pittsburgh, has changed its name, effective Jan. 1, to Westinghouse Electric Supply Co. Herman P. Andrae will remain president-treasurer and John C. Schmidtbauer will continue as secretary and vice-president.

Cleveland

CLEVELAND, Dec. 16.—Machine tool sales were fair the past week. In fact the volume of business was surprisingly good for this season of the year. The outlook also is promising as considerable business is pending for single machines. The Electric Auto-Lite Co., Toledo, which is building an addition for the manufacture of automobile lighting and starting equipment, placed six machines with a Cleveland dealer during the week and will buy considerable more equipment. Some business is also coming from other manufacturers of automobile equipment and parts. The United Engineering & Foundry Co., Pittsburgh, which recently purchased a number of tools, will buy some additional equipment for its Youngstown plant. Sales to Cleveland companies during the week included two openside planers.

New interests have acquired control of Paper & Textile Machinery Co., Sandusky, Ohio, manufacturer of paper-making machinery, etc., and will operate in future.

Expansion is planned. It is understood that W. H. Millsbaugh, president, will continue to be identified with company.

Hammond Mfg. Co., 7808 Kinsman Road, Cleveland, manufacturer of polishing machinery, drilling equipment and other mechanical specialties, has plans for one-story plant, 75 x 125 ft., to cost about \$60,000 with equipment. H. M. Morse Co., Finance Building, architect, will soon take bids on general contract.

Ric-Wil Co., Union Trust Building, Cleveland, manufacturer of underground conduits, etc., is contemplating one-story addition to plant at Barberton, Ohio, to cost more than \$45,000 with equipment.

Republic Stamping & Enamelling Co., Canton, Ohio, has plans for one-story addition, to cost more than \$85,000 with equipment. This will be part of a general expansion program to be carried out in 1930.

Cincinnati

CINCINNATI, Dec. 16.—Demand for machine tools in this district slackened the past week. Orders consisted of single tools and total sales were much less than those of the preceding week. While inquiries are in fair volume, buyers are holding up decision on quotations longer than usual.

A Cincinnati manufacturer has closed for one large lathe. An unnamed railroad is reported to be in the market for several large tools.

International Clay Machinery Co., 1140 Bolander Avenue, Dayton, Ohio, manufacturer of brick-making and other clay products equipment, has awarded general contract to A. P. Ziegler, Inc., Lowe Building, for one-story addition, 42 x 78 ft., to cost about \$25,000 with equipment.

Brownell Co., North Findlay Street, Dayton, Ohio, manufacturer of boilers, tanks, underfeed stokers, etc., has plans for a two-story addition, to cost more than \$150,000 with equipment. Geyer & Neuffer, Ludlow Arcade, are architects.

Cincinnati Tool Co., 1951 Waverly Avenue, Norwood, manufacturer of machine tools, is considering an addition to plant, to cost about \$100,000 with equipment.

Tennessee Eastern Electric Co., Johnson City, Tenn., is planning expansion to cost about \$100,000, including increase in generating facilities and transmission lines.

Virginia-Tennessee Marble Co., Friendsville, Tenn., operating local quarry properties and mill of Diamond Marble Co., recently secured under lease, is planning expansion, including enlargements in mill and installation of machinery for cutting, gridding, polishing, etc. Additional quarrying equipment will also be installed. Company is a subsidiary of Virginia Alberene Stone Co., which is operated by Alberene Stone Co., 153 West Twenty-third Street, New York.

American Cigar Co., 3001-15 Madison Street, Louisville, has taken out permit for an addition to cost about \$250,000, including material-handling equipment and air-conditioning apparatus; also permit for improvements in present plant to cost about \$50,000. Headquarters are at 111 Fifth Avenue, New York.

Louisville Water Co., Louisville, plans extensions and improvements in plants and system to cost about \$175,000, including installation of pumping machinery, power and auxiliary equipment.

United States Army, Air Corps, Fairfield Air Depot, Fairfield, Ohio, will soon

call for bids for a one-story aircraft assembling plant on Springfield Pike, to cost about \$100,000 with equipment; also for a one-story machine and repair shop, to cost about \$150,000 including equipment.

Exact Weight Scale Co., Columbus, Ohio, is completing new one-story plant, 60 x 278 ft., for occupancy early next year. It will cost more than \$75,000 with equipment. Carmichael & Millspaugh, Columbus, are architects.

Nashville Interurban Co., Nashville, Tenn., is considering new steam-operated electric generating plant at Franklin, Tenn., for traction line operation, to cost about \$100,000 with equipment. F. H. Tathwell is chief engineer.

Gulf States

BIRMINGHAM, Dec. 16.—Southern Wheel Co., 700 Sixth Avenue, South, Birmingham, manufacturer of car wheels, has awarded general contract to M. C. Banks & Co., 2501 Avenue A, for one-story machine shop, 60 x 80 ft., to cost about \$25,000 with machinery.

Southern Phosphate Co., Bartow, Fla., an interest of Davison Chemical Co., Garrett Building, Baltimore, has plans for new unit for mechanical drying, to cost over \$40,000 with equipment.

City Council, Port Arthur, Tex., has plans for municipal airport on waterfront to accommodate both land and seaplanes, including hangars, repair shops and other mechanical units. A fund of \$500,000 is being arranged for project.

Ford Motor Co., 3906 Harrisburg Boulevard, Houston, Tex., has awarded general contract to Tellepsen Construction Co., 3700 Clay Street, for two-story addition to local factory branch and assembling plant, 35 x 75 ft., to cost more than \$45,000 with equipment. Company engineers, Detroit, are in charge.

Common Council, Tyler, Tex., has begun grading of site on Dixie Highway for new municipal airport, to include hangar, 100 x 110 ft., with lean-to extension, 15 x 100 ft., for repair and reconditioning shop, to cost more than \$45,000. O. C. Palmer is manager for airport.

West Texas Utilities Co., Abilene, Tex., operating electric light and power properties, is disposing of a bond issue of \$8,250,000, part of proceeds to be used for expansion in power plants and system.

Board of Trustees, Prairie View College, Prairie View, Tex., has plans for one and two-story building, to include machine shop, metal and iron-working, wood-working and other departments, to cost about \$100,000 with equipment. F. E. Giesecke, College Station, is architect.

Natural Gas & Power Co., Brady, Tex., is considering construction of pipe line to Lampasas, Tex., and vicinity, with booster stations, etc., to cost more than \$80,000 with equipment.

Beaird Corporation, Shreveport, La., operating a welding works, is considering expansion program, to cost more than \$150,000 with equipment.

Good & Foster Aero Service Co., Dallas, Tex., is planning to rebuild hangar with shop facilities at Love Field, destroyed by fire Dec. 7.

United Gas Co., Fort Worth, Tex., operating natural gas properties, has purchased natural gas system and holdings of Magnolia Petroleum Co., Dallas, Tex., a subsidiary of Standard Oil Co. of New York, for about \$50,000,000. New owner will consolidate with its properties and plans construction of pipe lines, booster

stations and auxiliary structures for interchange in service.

City Council, Goose Creek, Tex., is considering construction of a municipal electric light and power plant, to cost over \$50,000 with equipment.

Emery, Peck & Rockwood Development Co., Seguin, Tex., has applied for permission to take over certain properties of Syndicate Power Co., including permit for a power dam at Marble Falls on Colorado River. Company plans hydroelectric power development at that location, to cost over \$250,000 with transmission system.

Gulf Paper Products, Beaumont, Tex., recently organized by O. B. Sawyer, 875 Fifth Avenue, and associates, plans erection of new factory, 60 x 125 ft., for manufacture of paper goods, tablets, etc., to cost about \$50,000 with machinery. W. B. Livesay, San Jacinto Life Building, is architect.

St. Louis

ST. LOUIS, Dec. 16.—Board of Education, 911 Locust Street, St. Louis, will ask bids early in January for five-story vocational high school, to cost \$950,000 with equipment. Architectural department of board is in charge.

Coca-Cola Bottling Co., 1115 Clark Avenue, St. Louis, has awarded general contract to Boaz-Kiel Construction Co., Ambassador Building, for one and two-story bottling plant, 130 x 250 ft., to include installation of conveying, elevating and other mechanical-handling equipment, to cost \$125,000 with machinery. W. S. Frank, Century Building, is architect.

Chamber of Commerce, Joplin, Mo., George Schier, member of airport committee, is at head of project to establish municipal airport, to include hangars, repair shops, oil storage and distributing building, to cost about \$100,000.

Wells Valve & Equipment Co., Bartlesville, Okla., care of M. G. Blair, Bartlesville, recently formed by Mr. Blair and associates with capital of \$25,000, plans operation of local factory to manufacture oil-well drilling and other equipment.

Board of Trustees, University of Oklahoma, Tulsa, Okla., has awarded general contract to W. S. Bellows Construction Co., Fifth Place and College Street, for three-story and basement petroleum engineering building on campus, 88 x 126 ft., to cost about \$150,000 with equipment. Henry C. Hibbs, American Trust Building, Nashville, Tenn., is architect.

United States Cold Storage Co., 500 East Third Street, Kansas City, Mo., is considering new seven-story cold storage and refrigerating plant, making second unit, to cost about \$1,000,000 with machinery. Site has been selected.

City Council, Tulsa, Okla., is arranging special election Dec. 31 to vote bonds for municipal improvements, including fund of \$600,000 for municipal airport, comprising hangars, repair shops and other field units.

Patterson Steel Co., North Xanthus Street, Tulsa, Okla., has filed plans for a one-story addition, 60 x 80 ft., for storage and distribution, to cost about \$25,000 with equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, has awarded a general contract to W. F. Kucharo, Des Moines, Iowa, for one-story factory branch, storage and distributing plant at Salina, Kan., to cost about \$50,000 with equipment.

Arkansas Natural Gas Corporation,

Ardis Building, Shreveport, La., is planning an expansion in Arkansas properties to cost about \$6,000,000, including pipe line construction, booster stations, etc.

Yaffee Iron & Metal Co., 501 South Eleventh Street, Fort Smith, Ark., has awarded general contract to A. S. Johnson, South B Street, for two one-story additions, for storage and distribution, to cost about \$30,000 with equipment. Haralson & Nelson, Merchants' National Bank Building, are architects.

J. R. Brockman Co., 617 North Second Street, St. Louis, plans investment of \$175,000 for erection of one-story building, containing about 35,000 sq. ft. of floor space, for fabricating and warehousing of pipe.

Lincoln Foundry Co., St. Louis, has awarded general contracts for a new plant at Mount Carmel, Ill., consisting of foundry, 60 x 420 ft., enameling building, 60 x 100 ft., and cupola, 30 x 30 ft.

Indiana

INDIANAPOLIS, Dec. 16.—Central Mfg. Co., Connersville, manufacturer of automobile axles, etc., has awarded general contract to Austin Co., Cleveland, for one-story addition, 100 x 200 ft., to cost about \$50,000 with equipment.

General Electric Co., 1635 Broadway, Fort Wayne, has taken bids on general contract for a six-story and basement addition to Fort Wayne Electric Works, 80 x 140 ft., to cost more than \$250,000 with equipment. Harris & Richards, Drexel Building, Philadelphia, are architects.

Indiana Service Corporation, Fort Wayne, operating electric light and power properties, is arranging for expansion to cost \$1,310,000, including extensions in power generating facilities, transmission lines and power substations.

Leader Specialty Co., 515 East Walnut Street, Indianapolis, manufacturer of plumbing equipment and supplies, has awarded general contract to Vern Headlee, 4246 Cornelius Avenue, for a one-story and basement addition, 45 x 112 ft., to cost about \$40,000 with equipment. Bacon & Tislow, Architect & Builders' Building, are architects. Claude J. Mick is general manager.

Bendix Brake Corporation, Bendix Drive, South Bend, manufacturer of automobile and aircraft equipment, has awarded general contract to H. G. Christman & Co., 306 Notre Dame Avenue, for one-story addition, to cost about \$45,000 with equipment. Company plans erection of additional units at early date.

Pacific Coast

SAN FRANCISCO, Dec. 12.—Southern Pacific Railway, 65 Market Street, San Francisco, is considering extensions and improvements in shops at Sparks, Nev., to cost more than \$70,000 with equipment.

Procter & Gamble Co., Gwynne Building, Cincinnati, has taken title to property, 521 x 1255 ft., at Long Beach, Cal., and has plans for initial units of new plant, consisting of two main buildings, 100 x 700 ft., and 100 x 500 ft., for which bids will be asked soon. A battery of 12 steel storage tanks will be installed; a 500-ft. wharf also will be built. Project will cost about \$5,000,000 with machinery.

Byron-Jackson Pump Co., Berkeley, Cal., manufacturer of pumping machinery,

oil-well supplies, etc., will soon begin work on one-story addition, to cost about \$30,000 with equipment. General contract has been let to Austin Co. of California, Inc., Oakland.

Department of Public Utilities, Tacoma, Wash., Ira Davisson, commissioner, is considering construction of steam-operated electric generating plant for emergency service in connection with municipal hydroelectric generating stations, to cost over \$150,000 with machinery.

Puget Sound Navy Yard, United States Navy, Bremerton, Wash., has secured an appropriation of \$31,000 for addition to machine shop. Capt. E. R. Gayler is in charge.

Compton Union High School District, Compton, Cal., will build one-story vocational training shop at new junior high school group in Enterprise district to cost over \$200,000, for which bids will be received on general contract on Jan. 3. John C. Austin and Frederic M. Ashley, Chamber of Commerce Building, Los Angeles, are architects.

Vallejo Electric Light & Power Co., Vallejo, Cal., is planning extensions and improvements to cost about \$50,000.

Canada

TORONTO, Dec. 16.—While demand for machine tools has tapered from that of a couple of months ago, sales are up to average for this season of the year. Inquiries coming out give good indications of more extensive buying in the early part of the new year. Replacement buying is a feature of present business with some small lists for plant additions. The recent heavy placing of rolling stock orders by Canadian railroads is beginning to have a stimulating effect. The automotive industry is buying in a small way.

A Toronto syndicate has purchased Georgetown Foundry & Machine Co., which will hereafter be known as Credit Valley Foundry Co., Georgetown, Ont. Production is expected to start in near future. A new electric smelting furnace will be installed.

Aluminum Co. of Canada, Ltd., 158 Sterling Road, Toronto, has awarded several contracts for erection of an addition, to cost \$50,000.

Canadian Paperboard Co., 32 Front Street, Toronto, has awarded contracts for erection of an addition, to cost \$60,000.

A. Wander, Ltd., 455 King Street West, Toronto, has let general contract to T. A. Brown Co., Ltd., Wolfe Street, Peter-

borough, Ont., for a plant at Peterborough, to cost \$50,000. Chapman & Oxley, 372 Bay Street, Toronto, are architects.

Weaver Canadian Co., Ltd., manufacturer of automobile jacks, pumps, etc., Chatham, Ont., will start work in spring on a plant addition.

Bids are being received, no closing date, by C. H. R. Fuller, business administrator, Centre Street School, Oshawa, Ont., for machine shop equipment, for Board of Education.

United Mfg. Co., Cap de la Madeleine, Que., has awarded contracts for erection of a plant, to cost \$85,000. Charles Page Construction Co., Three Rivers, Que., has general contract. Philip Fainer, 1470 Peel Street, Montreal, is president of company.

Stewart-Warner Speedometer Corporation, Chicago, is considering consolidation of its Canadian units at Belleville, Ont. Plans are under way for erection of two two-story buildings, 50 x 180 ft., and 40 x 50 ft.

Western Canada

Pilkington Brothers (Canada), Ltd., 163 Market Street East, Winnipeg, contemplate erection of a glass manufacturing plant at Regina, Sask., to cost \$80,000.

Soo Line Mills, Ltd., Weyburn, Sask., will start work soon on erection of flour mill, to cost \$100,000.

Canadian National Railways, A. A. Tisdale, Winnipeg, general manager of Western region, contemplates building a rail salvaging plant at St. Boniface, Man.

Kapoor Lumber Co., Cowichan Lake, B. C., has plans for a two-story sawmill to cost \$50,000.

In connection with hydroelectric power development plant at Lois River, B. C., for Powell River Power Co., Powell River, B. C., contract for first unit has been awarded to Stuart Cameron Co., Ltd., 543 Granville Street, Vancouver, B. C., at a cost of about \$2,000,000. R. Bell-Irving is engineer.

Foreign

PLANs are under way by Ygnacio Soto, Nogales, Ariz., and associates, for construction of new cement mill at Hermosillo, Sonora, Mexico. Project will include power house and will cost close to \$500,000 with machinery. It is expected to organize a company to carry out development, which has backing of Francisco Elias, governor of Sonora, Hermosillo.

Gillette Safety Razor Co., 15 West First Street, Boston, has secured concession

from Soviet Russian Government for construction of plant in that country to manufacture razor handles and blades, to cost more than \$1,000,000.

Officials of British Shareholders Trust, Ltd., London, England, headed by Sir John Ferguson, have formed British Can Co., Ltd., with initial capital of £536,000 (about \$2,680,000), to manufacture tin cans and containers. Company has purchased plant and business of Ernest Taylor, Ltd., Liverpool, manufacturer of cans and metal containers, and will operate as first plant. Plans are under way for erection of other works. In addition to capital issue noted, company will dispose of 186,000 shares of preferred stock, to total about \$930,000. New organization will be associated with American Can Co., 230 Park Avenue, and Thermokept Corporation, 522 Fifth Avenue, New York, both holding a financial interest in company. Edgar W. Carmmond, president of British Shareholders Trust, Ltd., will be identified in an official capacity with new organization.

A company at Liverpool, England, has acquired a 40 acre tract on Manchester ship canal, as site for a newsprint paper mill. It will have a capacity of 60,000 tons per annum and is scheduled for completion in about 12 months. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference United Kingdom No. 320708.

Stiassny Glass Works, Vienna, Austria, will build a new plate glass manufacturing plant at Burmoos, near Salzburg, to cost more than \$800,000 with machinery. Site has been acquired and work will proceed at once.

Latvian Marine Department, Riga, is planning construction of a three-story warehouse in harbor district, for which three lifting cranes and other mechanical-handling equipment will be purchased. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Riga No. 97435.

New Trade Publications

Cross-Drum Boiler.—Erie City Iron Works, Erie, Pa. Four-page folder illustrating and describing a cross-drum boiler which is made in three diameters, 42, 48 and 54 in. It may be fired by mechanical stokers, or with pulverized coal or fuel oil.

Deaerator and Hot-Water Generator.—Cochrane Corporation, Philadelphia. Bulletin 686 of 20 pages, illustrating and describing self-contained deaerator and hot-water generator; also describing the heating, deaerating, softening, filtering and metering of water, measuring of steam and profitable utilization of low-pressure steam, etc.

Electric Hoists.—Robbins & Myers, Inc., Springfield, Ohio. Bulletin 5031, of 16 pages, illustrating and describing various types and sizes of electric trolley-type hoists. Clearance diagrams and other dimensions are given. Ratings are 250 to 15,000 lb.

Electric Gasoline Gage.—General Electric Co., Schenectady, N. Y. Bulletin GEA-1182 of 4 pages illustrating and describing electric gasoline gage for aircraft, designed to meet requirements for reliability, accuracy under all conditions of flight, light weight and simplicity of installation.

Switchboards.—Westinghouse Electric & Mfg. Co., East Pittsburgh. Folder with illustrations describing truck-type switchboards in various applications.

Production, Shipment and Sales of Materials and Building Contracts

	November, 1929	October, 1929	November, 1928
Trackwork for T-rail track, shipments(a), net tons.....	11,326(b)	12,902	8,379
do. eleven months.....	151,289	.....	128,584
Portland cement production(c), thousand bbl.	14,036	16,731	15,068
do. do. eleven months.....	158,932	.....	163,779
do. shipments.....	11,205	18,695	11,951
do. do. eleven months.....	163,445	.....	168,071
Building construction contracts(d)....	\$391,013	\$445,642	\$471,482
do. eleven months.....	\$,437,922	.....	\$,195,530
do. new work contemplated....	720,301	800,000(e)	935,000(e)
Mechanical stokers sold(f), number....	107	178	116
do. horsepower.....	39,469	56,108	30,939
do. eleven months.....	554,609	.....	459,476

(a) American Iron and Steel Institute. (b) Lowest total since last January. (c) United States Bureau of Mines. (d) F. W. Dodge Corporation; amounts in thousands. (e) Approximate. (f) Department of Commerce.

Continental Shares, Inc., Reveals Steel Stocks

Holdings of stock in steel companies by Continental Shares, Inc., Cleveland, an investment trust controlled by the Otis-Eaton-Mather group, are revealed in the listing of that company's stock on the New York Stock Exchange. The largest single holding is 245,142 shares in the Cleveland Cliffs Corporation, formed last June as a holding company that effected a merger of the Cleveland Cliffs Iron Co. and Cyrus S. Eaton interests.

Other steel plant stock held by Continental Shares Oct. 31, as listed, were: Central Alloy Steel Corporation, 46,700 shares, Inland Steel Co., 1000 shares, Youngstown Sheet & Tube Co., 8000 shares, Donner Steel Co., Inc., 250,000 shares, Donner Steel Co. preferred 15,000 shares, and Wheeling Steel Corporation, 3243 shares. Ownership in various other industrial stocks was listed as well as public utility and bank stocks.

The Cliffs Corporation, it was disclosed, holds 99,860 shares in the Republic Iron & Steel Co., 99,860 shares in the Inland Steel Co., 125,821 shares in the Youngstown Sheet & Tube Co., 109,837 shares in the Central Alloy Steel Corporation, 29,957 shares in the Wheeling Steel Corporation and 397,736 shares in the Cleveland-Cliffs Iron Co.

The holding company stated that the total value, as of Nov. 30, of all of its securities was \$130,000,303 against an original cost of \$122,355,813, or an appreciation of \$7,644,490 despite the recent decline in stock values.

C. S. Eaton is chairman of Continental Shares, Inc., and W. R. Burwell is president.

Many Accidents Caused by Moving Material by Hand

Of the accidents occurring in industrial plants from non-mechanical causes 33½ per cent were the result of manual handling of material, according to a survey recently made by Edward O. Allard, manager of the safety engineering and inspection department of the American Surety Co. and its affiliated company, the New York Casualty Co. In machine shops the survey revealed that 46 per cent of the accidents were due to moving materials by hand.

Road Machinery Sales Large

Orders for road building machinery have been booked in such volume by Foote Brothers Gear & Machine Co. as to keep the plant operating at full capacity for more than four months, according to a statement by W. C. Davis, president of the company. The regular quarterly dividends of \$1.75 a share on the preferred and 30c. a share on the common stock have been declared, payable Jan. 2.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

BUSINESS men are generally optimistic, although manufacturing, general industry and jobbing trades are markedly lower than a year ago. Retail trade is slightly lower, although sales of low-priced novelties are very good . . . Fur merchants report 1929 sales 13 per cent under the 5-yr. average.

COMMODITY index is down 0.1 per cent; the sharpest decline noted is in wheat (7c. per bu.) due to slow export demand . . . Secretary of Agriculture Hyde estimates the 1929 farm income (\$12,500,000,000) to be higher than any year since 1920, except one . . . Arthur Reynolds, leading Chicago banker, advises rural correspondents that present situation warrants no other than usual precautions in supplying funds to local manufacturers and merchants.

UNION miners in western Kentucky coal fields strike for revised wage scale . . . Garment workers' unions have authorized several strikes, to commence early in 1930, where contracts expire or where working conditions are held to be subnormal . . . Establishment of impartial umpire and special mediation court has adjusted amicably 95 out of every 100 disputes occurring in New York garment trades during the past five years.

COTTON textile manufacturing is distributed unevenly; sales for the whole industry amount to about two-thirds of current production; unfilled orders equal four-fifths of finished stocks . . . Goodyear Tire & Rubber Co. starts a 50,000-spindle plant in Georgia for tire fabric . . . Woolen trade in New England is very quiet.

COPPER production in the Northwest has been curtailed . . . Good prices for the metal and improved technology have expanded the copper output of northern Michigan about 10 per cent over 1928 . . . A \$4,000,000 copper refinery has been completed at El Paso, Texas . . . Joplin, Mo., zinc district, with capacity of 14,000 tons per week, is operating on a 6000-ton basis . . . Low prices for tin have slowed up all trade in Bolivia and have caused the Federated Malay States to prohibit expansion of placer mining areas.

DIVIDENDS on common and preferred stock were increased from \$4 to \$5 by Westinghouse Electric & Mfg. Co. . . . A civic organization in New York charges that each customer pays \$8.28 annually on "water" in local electric utility stock . . . Federal Power Commission notes that steam-generated power is increasing at a far more rapid rate than hydro-electric, "due to unnecessary handicaps of legislation and regulation" . . . Governor Roosevelt of New York said that the Government should own and operate power plants at Muscle Shoals, Boulder Dam and on the St. Lawrence, "to remain forever as a yardstick to measure the cost of electricity."

EMPLOYMENT in the United States is seasonably low, but not much lower than in 1927 or 1928 except in one or two centers—notably St. Louis . . . Unemployment in Germany and Austria is especially acute; 1,400,000 are receiving doles and the German treasury is nearly empty . . . Belgian and Dutch diamond cutters (about 40,000 in number) are working half time, and the Diamond Syndicate has withdrawn all offerings of uncut stones to the trade . . . France, however, has only 577 registered unemployed. Its population of 40,750,000 is 2,220,000 less than 1911, despite the importation of about 3,000,000 alien laborers.

CIGARETTES have been cut in retail price by chain stores to a figure less than wholesale cost to the small dealer . . . Schulte-United 5c. to \$1 Stores, passes \$1.75 quarterly dividend.

RAILWAY net earnings in October were 5.6 per cent less than in 1928, largely due to decreased movement of grain in West . . . Interstate Commerce Commission authorizes 160 miles of railroad construction near the Texas-New Mexico border, and orders the Union Pacific to construct a 185-mile connection to the Southern Pacific through the Cascade Mountains in Oregon . . . A 5-year, \$140,000,000 job of removing 4½ miles of track from streets in Manhattan to a private right-of-way (elevated and subway) is commenced by the New York Central Railroad.

STORM and floods strand 70 large vessels on northern European shores and destroy much property . . . Royal Mail Steam Packet Co., which controls one-sixth of the British merchant marine, passes a dividend . . . Four new 7000-ton 14-knot ships, in addition to two now building, will be required for new mail routes to the Black Sea, assigned to American Export Line.

RADIO service is commenced, Sayville, N. Y., to Lima, Peru . . . O. D. Young and J. G. Harbord of General Electric Co. and Radio Corporation of America, tell Senate committee that unification of cable, wire and wireless foreign communication, under either Government regulation or ownership, is necessary to meet competition with systems subsidized or owned by foreign governments . . . Only 168 of the 317 broadcasting stations returned profits in 1929.

AMERICAN signature was affixed to the constitution of the Permanent Court of International Justice, as directed by President Hoover, including the Root formula to cover Senate reservations . . . Great Britain officially interprets Kellogg peace treaty to mean that there can be no neutrals in the next war.